IRON & COAL

THE IRON AND COAL TRADES' REVIEW

VOL. 182 No. 4838

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LONDON: FRIDAY, APRIL 7, 1961

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11 COKING PLANTS PUT TO WORK IN 1960

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- Bairds & Scottish Steel Limited
- John Lysaght's Scunthorpe Works Limited
- Richard Thomas & Baldwins Limited

3 REBUILDS
- Guest Keen Iron & Steel Co. Ltd.
- Colvilles Ltd.
- The Lancashire Steel Corporation Limited

7 COKING PLANTS UNDER CONSTRUCTION AT THE BEGINNING OF 1961

4 NEW INSTALLATIONS
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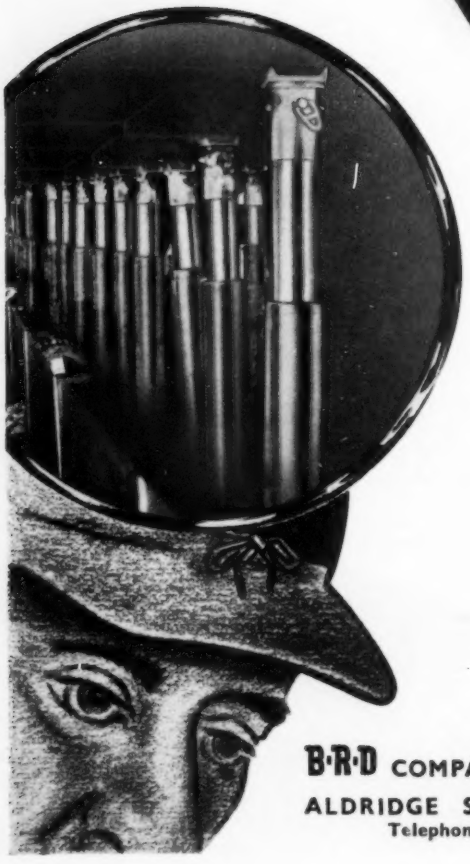

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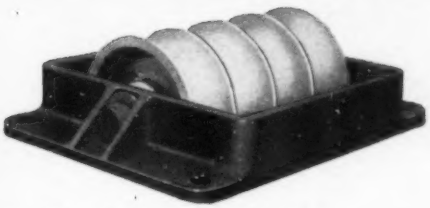
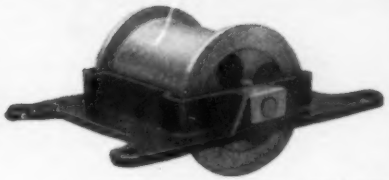


'CY' Multiple Rollers mounted in Malleable Iron Frame



'CY' Rollers to NCB Spec. P110/1954 mounted in Malleable Iron Frame with renewable 'Wynite' bearings. 14 ranges of sizes available, also supplied with Ball or Oilite bearings.

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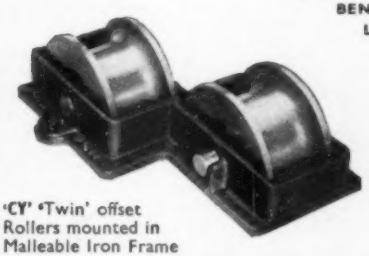

'CY' 'Twin' offset Rollers mounted in Malleable Iron Frame

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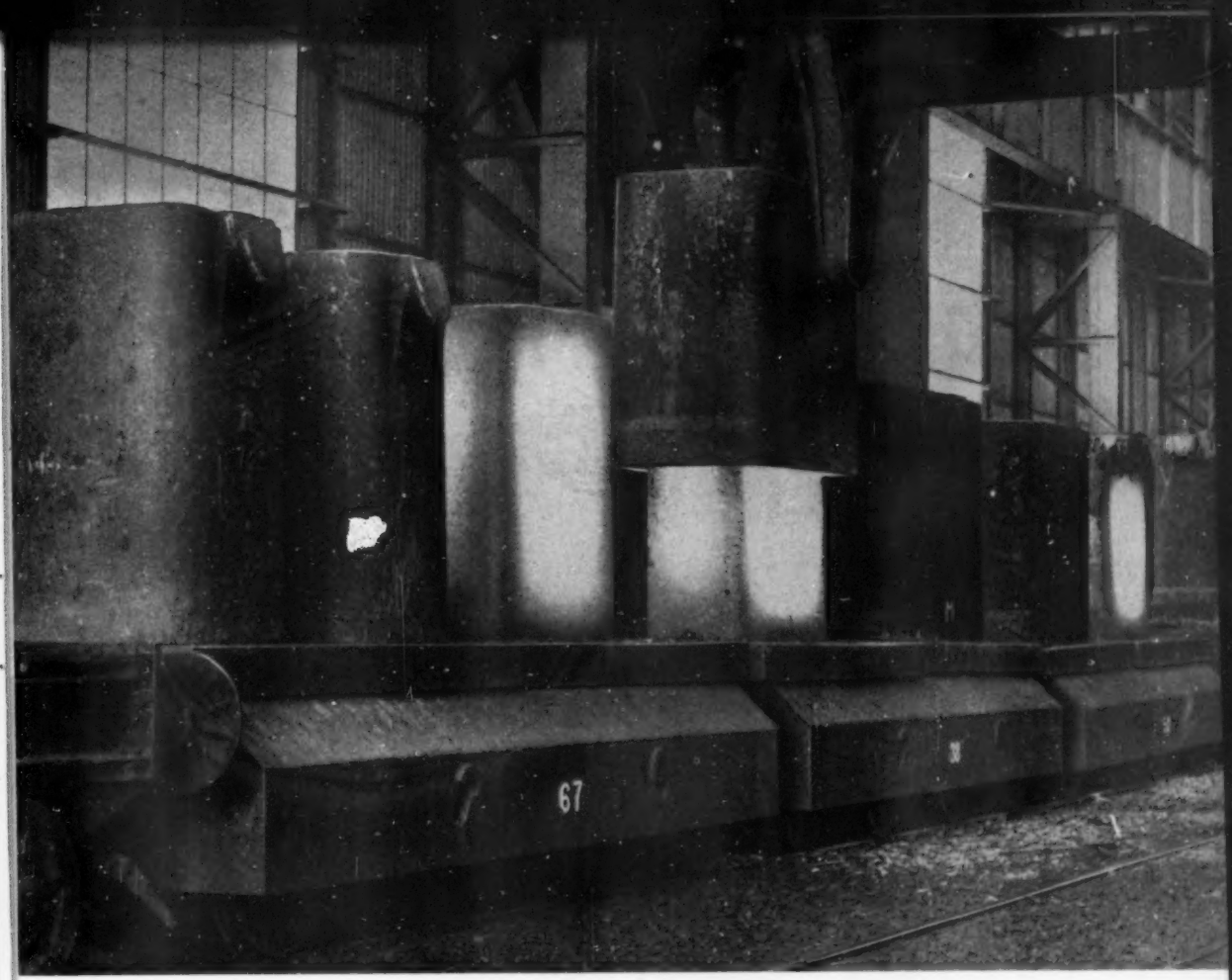

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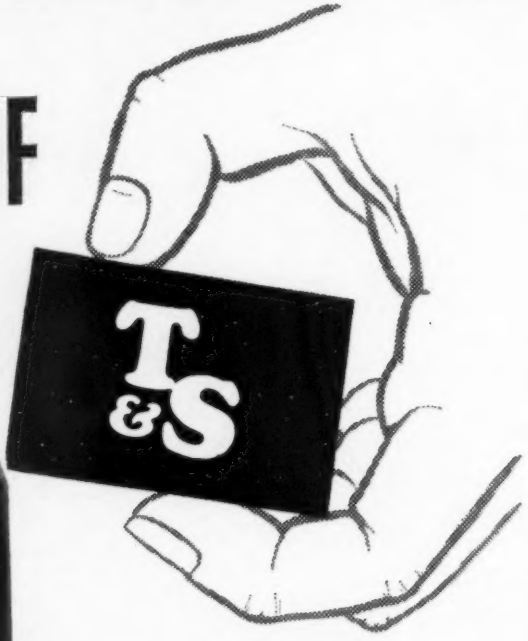

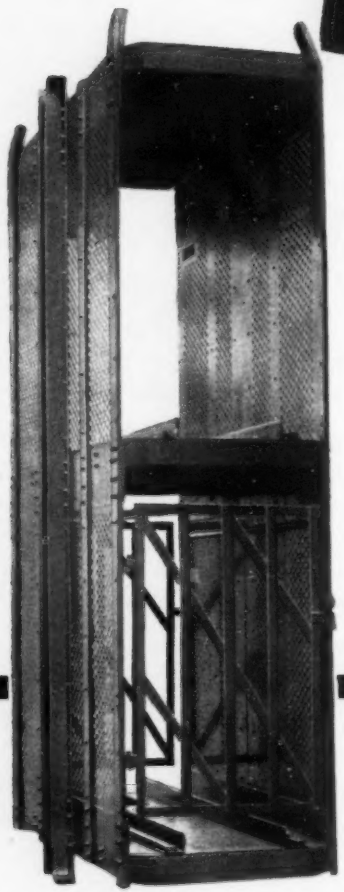

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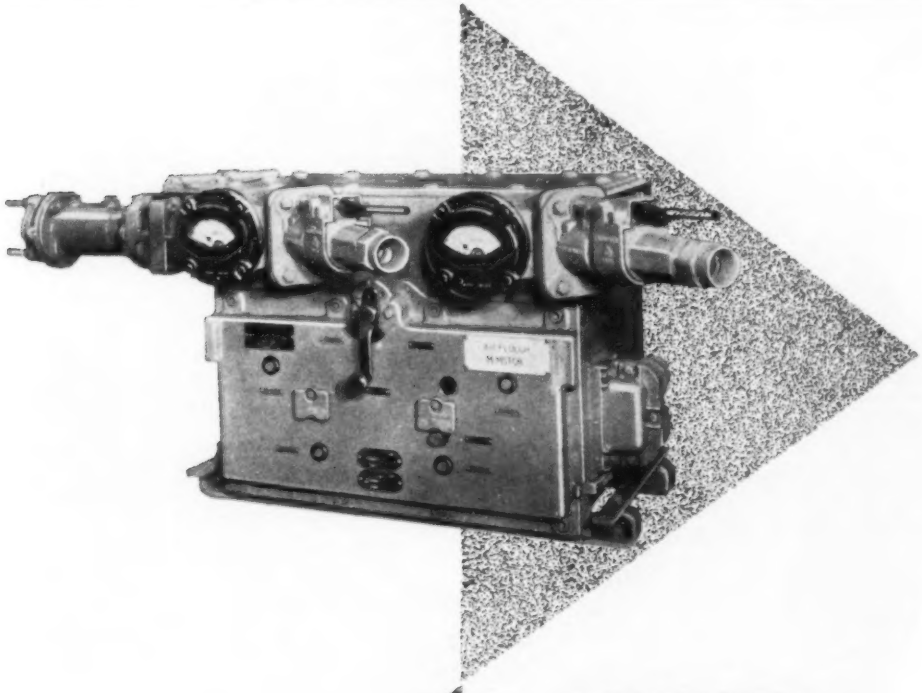

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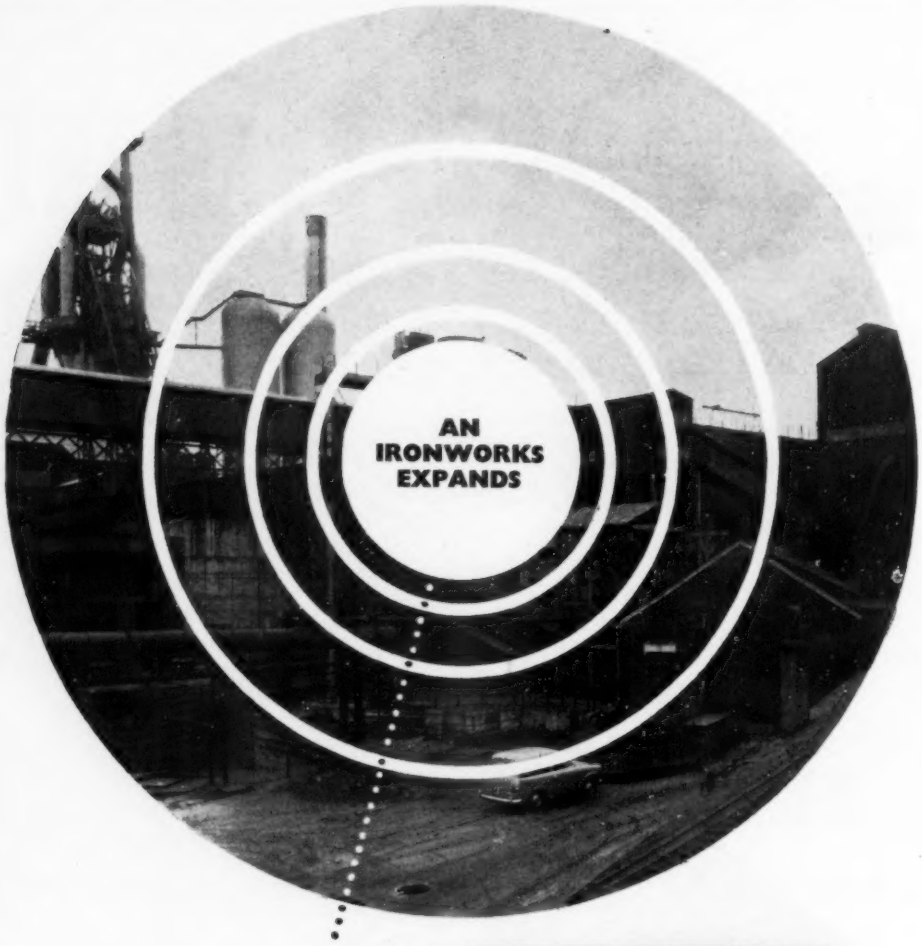

and so a sinter plant is built

TODAY

The blast furnaces are consuming the full output of the sinter machine HH installed as part of the expansion programme at the Gartsherrie Works of Bairds & Scottish Steel Ltd.

TOMORROW

To cater for the future, the plant was designed so that a second sinter machine, although located away from the first strand, can receive raw materials from the same feed system.

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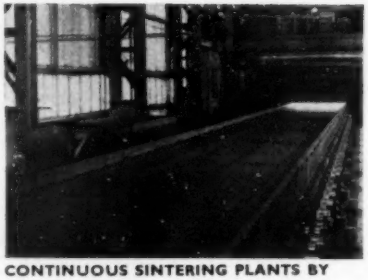

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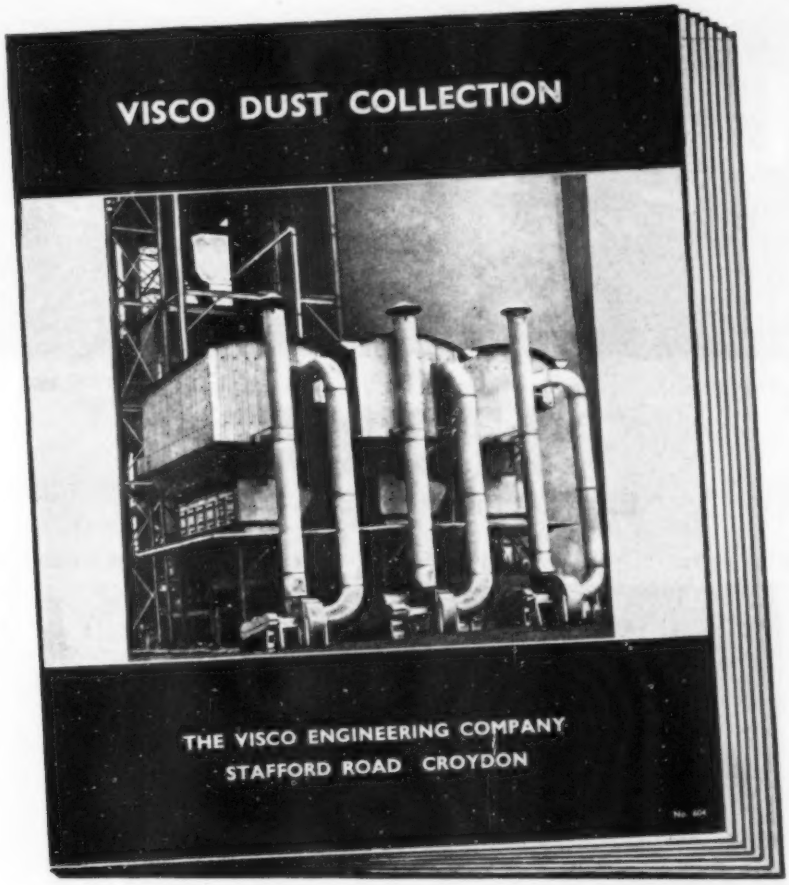

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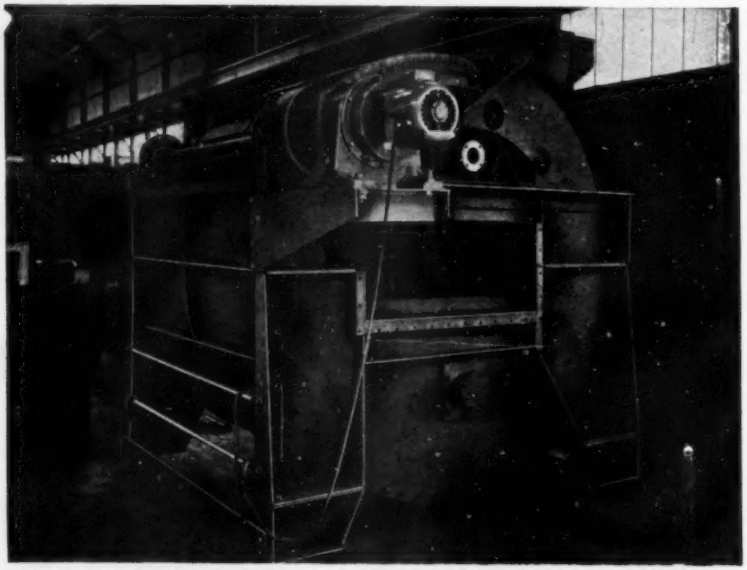

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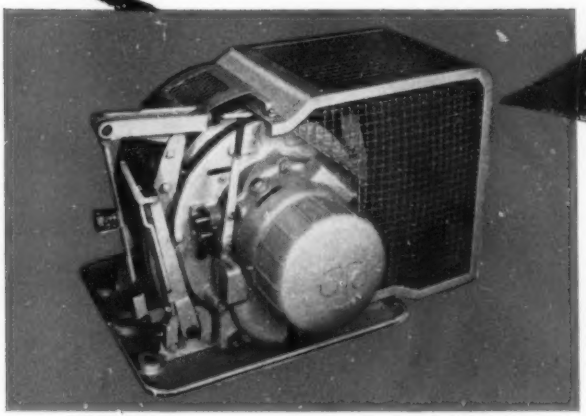
This PIKROSE FRONT SAFETY GUARD gives ADDED safety



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In addition to the standard rope guard always supplied with our Haulage Gears and Hoists, we are pleased to introduce the New 'PIKROSE' Front Safety Guard. This Guard, which is available as an optional extra, ensures that personnel working on or near the Haulage Gear are unable to reach any moving parts, including the rope drum, whilst the machine is in operation, so preventing accidental injury to hands or feet.

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Automatic Hydraulic Haulage Gears Sizes H1, H2 and H3.

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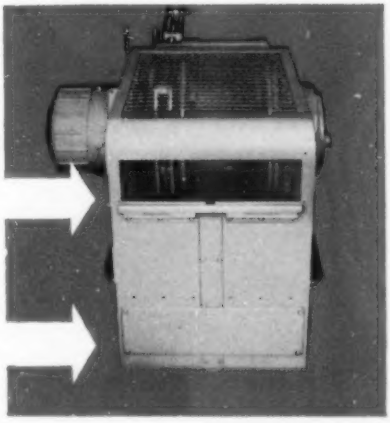

The front panels of the guard may be removed and located in an alternative position depending on whether the rope is overwound or underwound.

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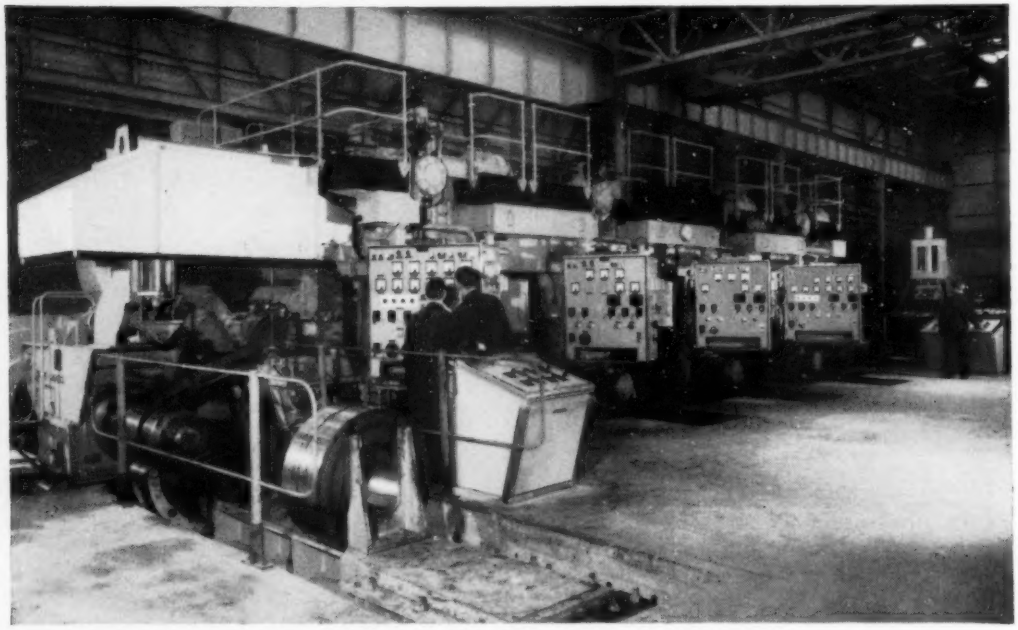

First again!

Britain's first tandem cold strip mill to be supplied from mercury-arc converters was electrically engineered and commissioned by 'ENGLISH ELECTRIC' at the new Brinsworth Cold Mill of Steel, Peech and Tozer Ltd., Rotherham.

The main drives, screwdowns, coilers, and excitation are all supplied by mercury-arc converters. Also in this installation—again, for the first time in Britain—static switching logic elements are incorporated in the control scheme of a rolling mill. These techniques reduce the number of moving parts to the minimum.

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MT 60

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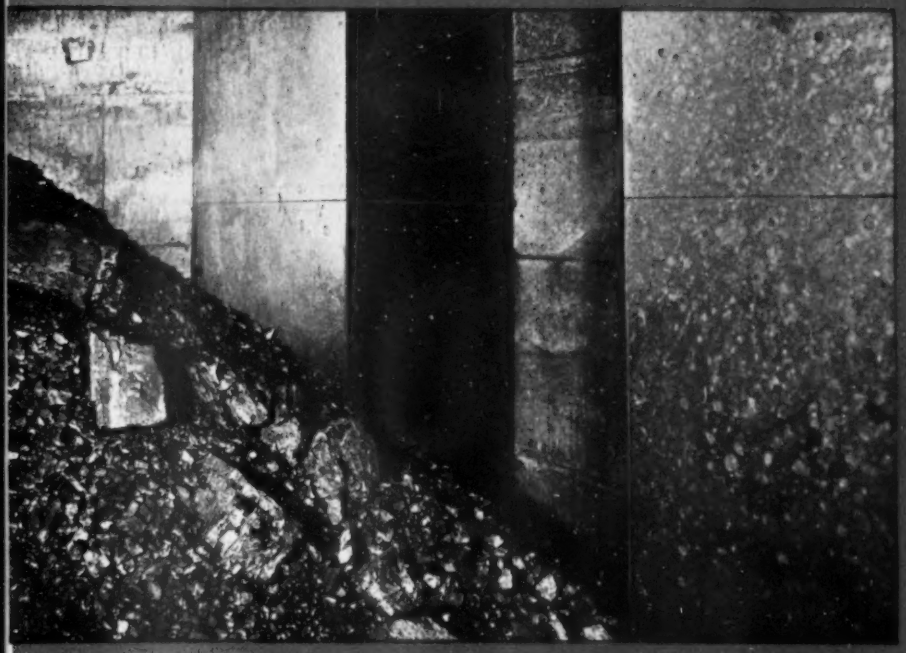
GOOD NEWS for anybody worried about coal degradation in bunkers.



After many months of experimental work, Qualter Hall now introduce a really efficient bunkering system to beat the bogey of coal breakage in bunkers.

ANTI-BREAKAGE TRUNKING

(Patent applied for)

eliminates the bulk movement of bunkered coal and converts a bunker into a by-pass unit; it must of course be combined with a Qualter Hall BUNKER SPIRAL CHUTE for bunker filling.

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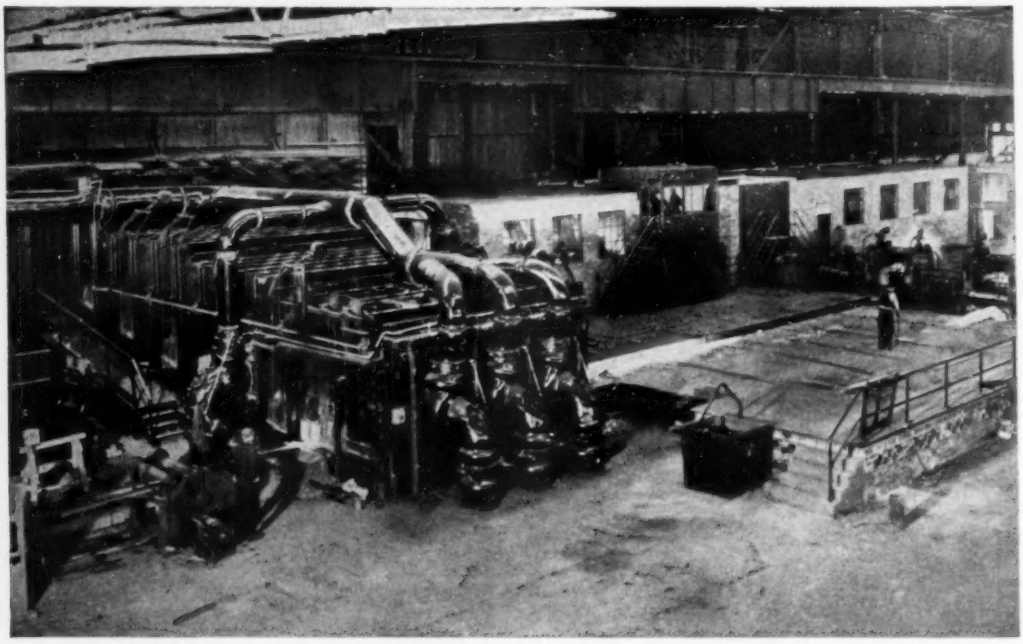

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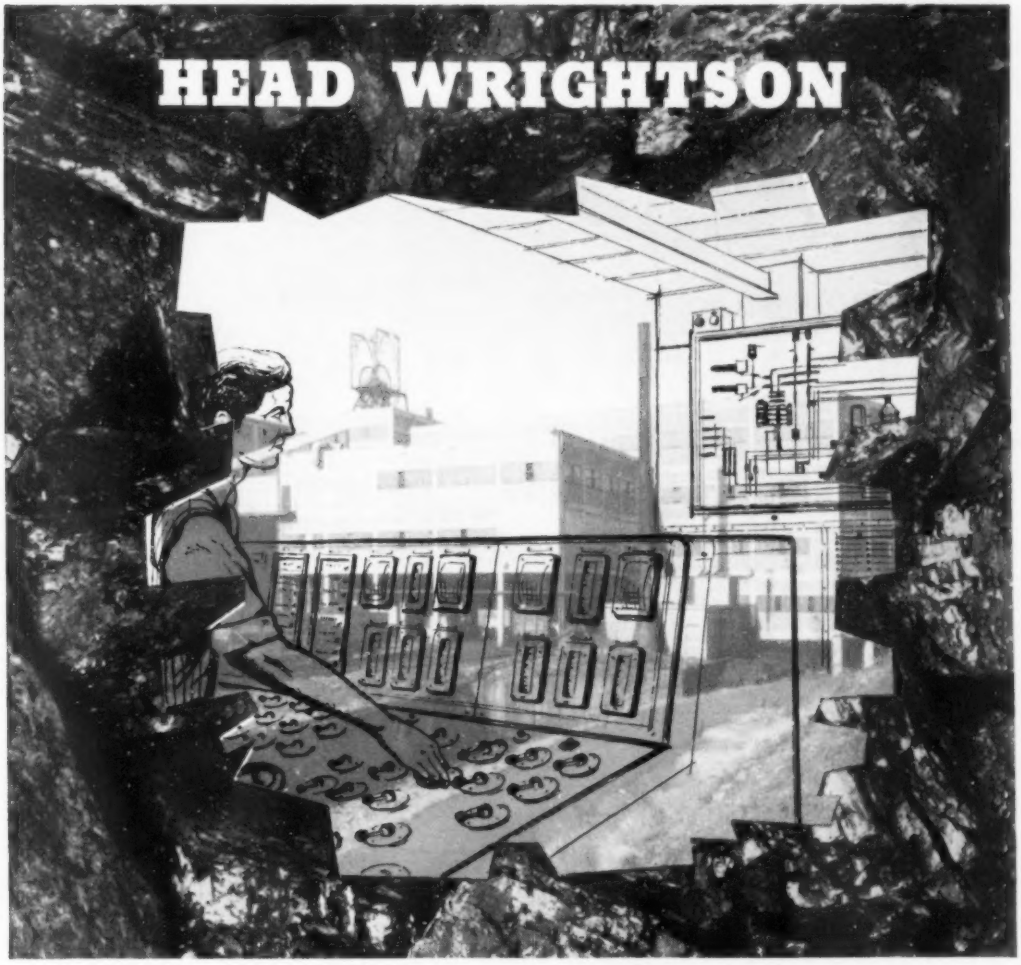

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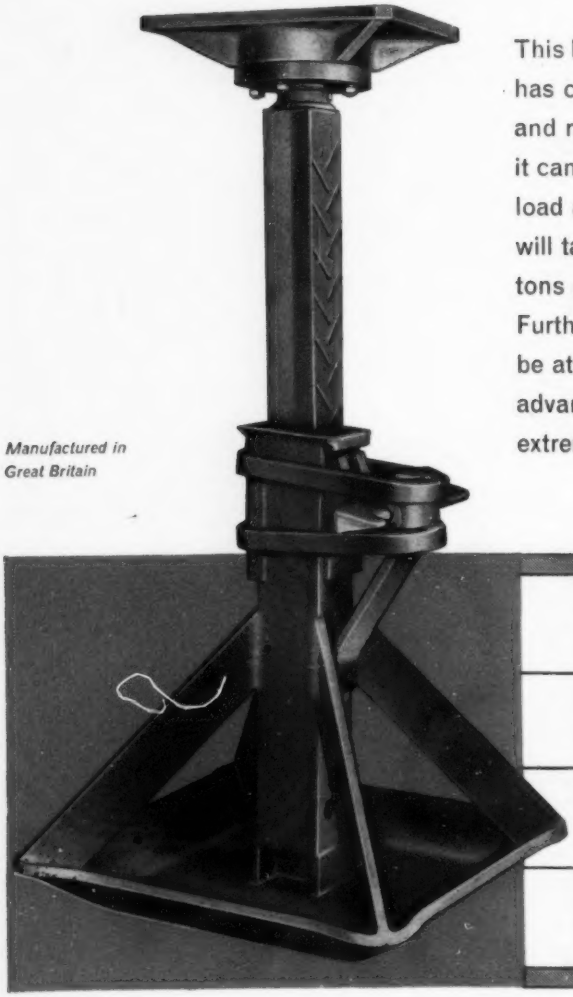

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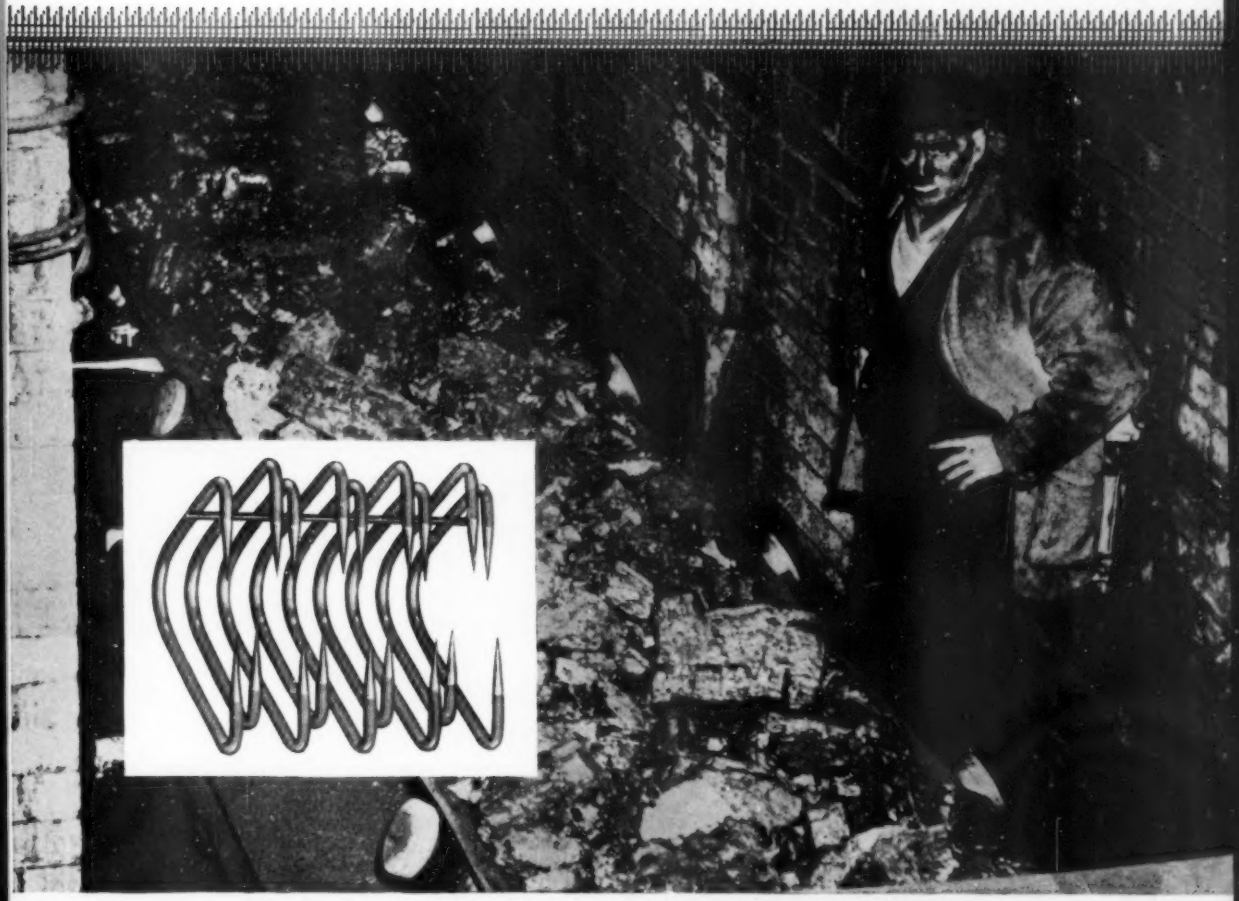

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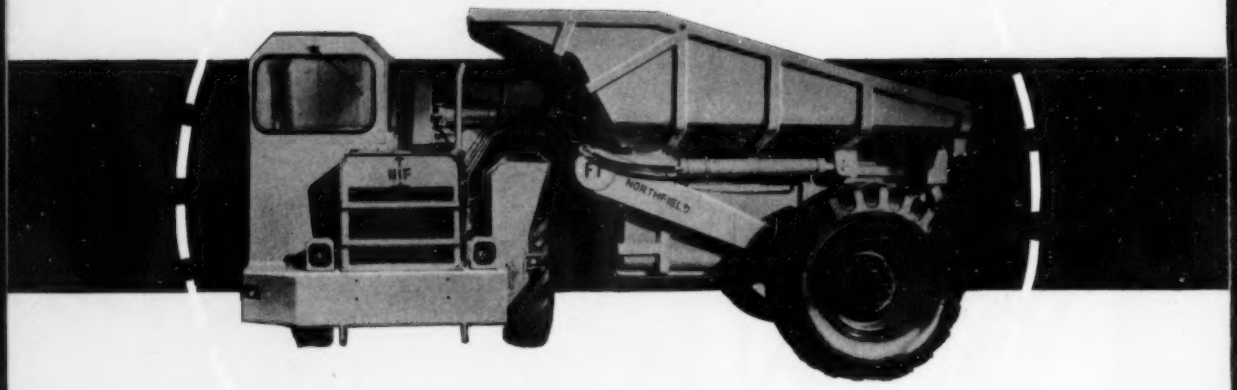

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TRANSMISSION: Brockhouse Torque Converter and epicyclic gearbox, providing an automatic gear ratio of between 6.54 and 1 to 1 in two forward speeds, and 6.54 and 22 to 1 in reverse.
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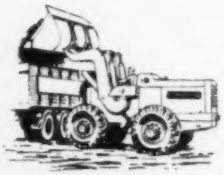
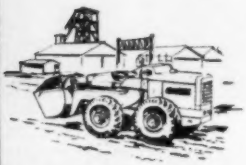
Well known throughout the world and now available in Great Britain, is the HOUGH PAYLOADER Tractor Shovel. With a 2 cu. yd. rated payload and 105 h.p. Leyland UE375 engine, driving through a torque converter and the exclusive 3-speed-range "Paylomatic" power transmission, the new BH-70 offers these outstanding features: Longer wheelbase for maximum stability; unique curved design of the lifting arms providing exceptional operator safety, unimpaired vision and a 9′ 0″ discharge height. Exceptionally powerful pry-out is achieved by use of reverse bucket cylinder action and skid-shoes. Full details and complete specification will be supplied on request.



NOW MADE IN GREAT BRITAIN

and immediately available



CRIPPS

INTERNATIONAL HARVESTER

for Construction Equipment—the finest on tyres and tracks!

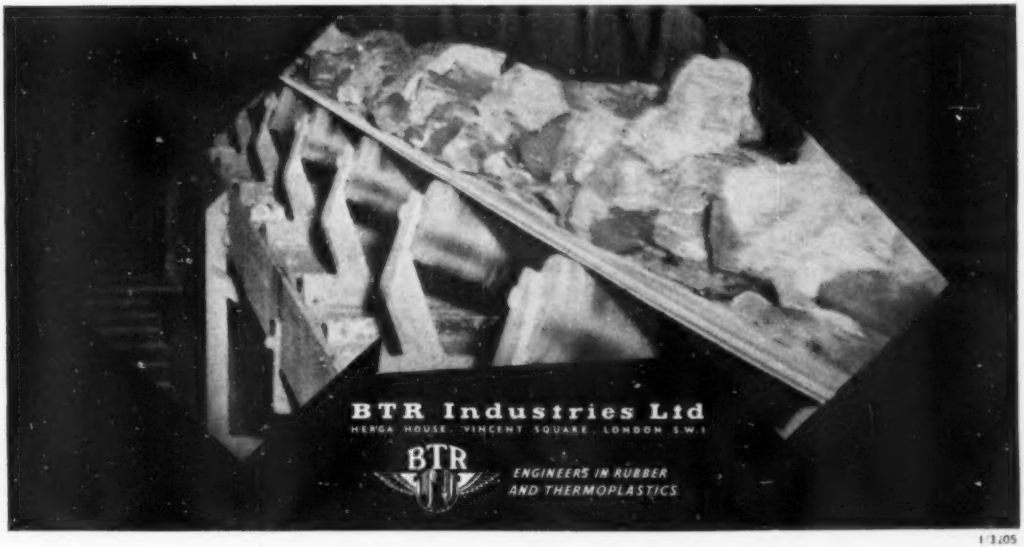
R. CRIPPS & COMPANY LIMITED

NOTTINGHAM, Telephone: 71161.

MANCHESTER, Telephone: Trafford Park 1658. SHILDON (Co. Durham), Telephone: 261.

BTR CONVEYOR BELTING

Steel production, from quarry face to finished stock, calls for the best of equipment . . . for conveyors this means BTR-engineered belts. That's why Richard Thomas & Baldwin Ltd installed BTR belting at Ystrad, near Ebbw Vale—to meet and beat the challenge of heavy, belt-punishing limestone.
For your conveyors, whatever the load, there is a BTR belt that's right for the job!



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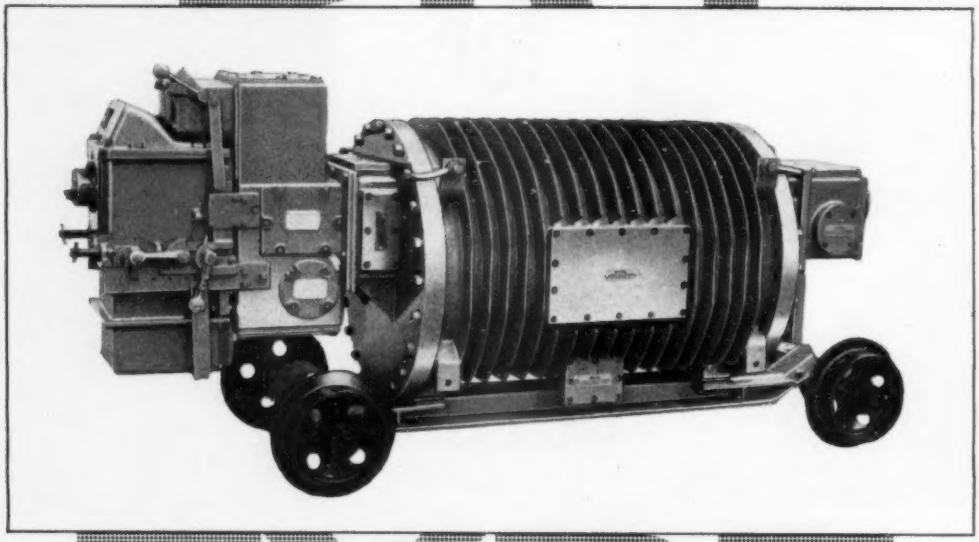
FLAME PROOF

DRY



TYPE

MINING TRANSFORMERS

1 *The most widely used and first wholly British Dry-Type Transformer of its kind. Unlike the more conventional units it can be taken right up to the coal face. Location close to load centre reduces voltage drop through connecting cables and ensures better starting and operation of coal cutting motors.*

2 *Strong tank, free from projections likely to collect dust, can withstand normal falls of rock commonly experienced near coal face.*

3 *High temperature dry type windings eliminate cooling fluids and possible hazards caused by fire or toxic gases. Maximum case temperature below that of conventional oil filled transformer. Further drop in temperature across cooling fins acts as safeguard against burn discomfort through accidental contact.*

BRUSH

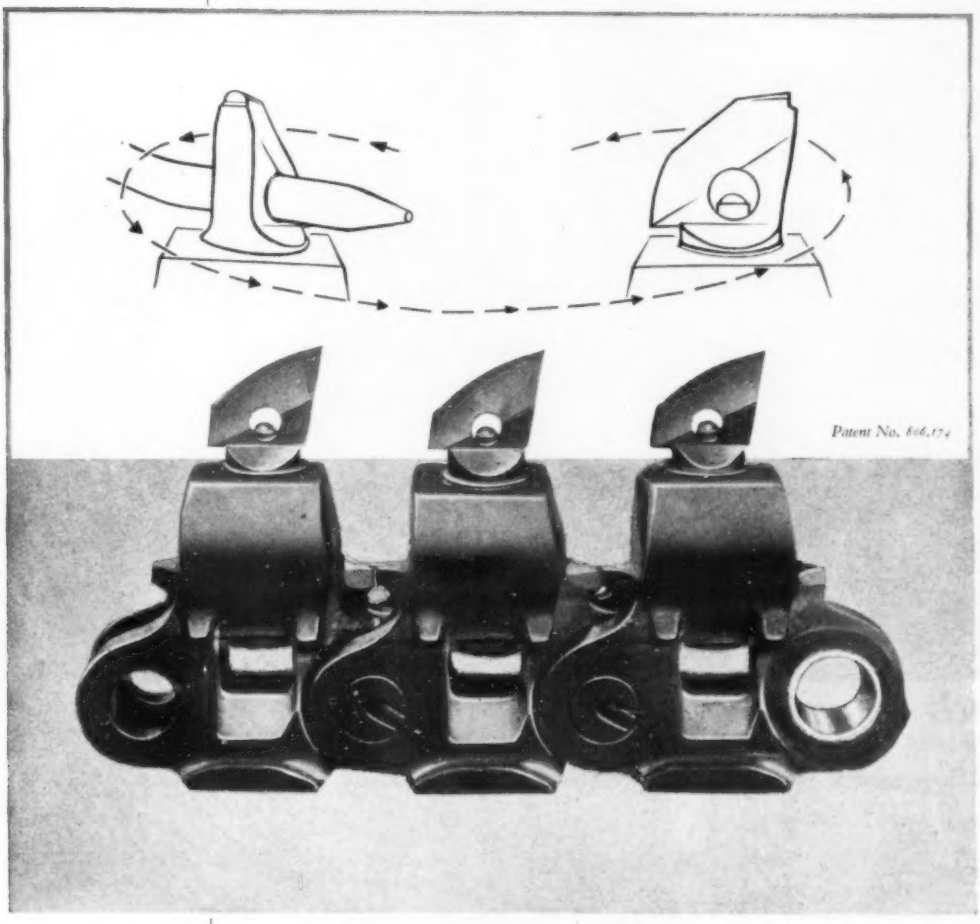
BRUSH ELECTRICAL
ENGINEERING CO · LTD
LOUGHBOROUGH · ENGLAND

FLP
4196 GROUP I

A Member of the Hawker Siddeley Group

7.4

Reversible Pick CUTTER CHAIN



hoy

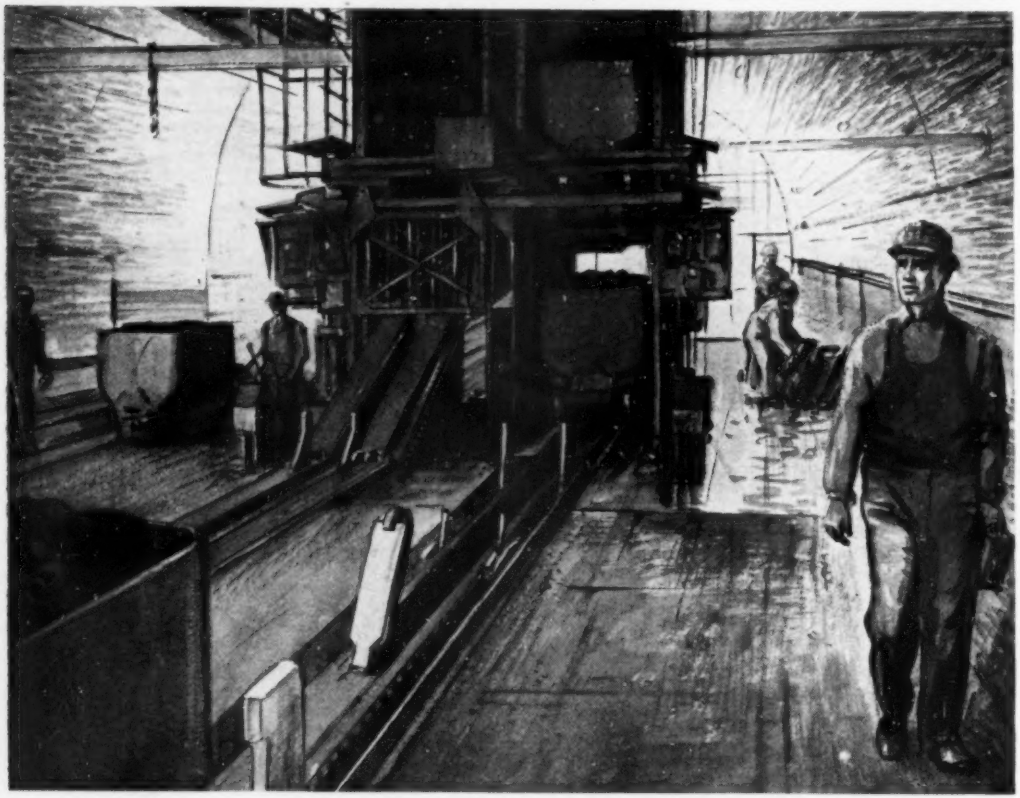
ABOUT TURN!

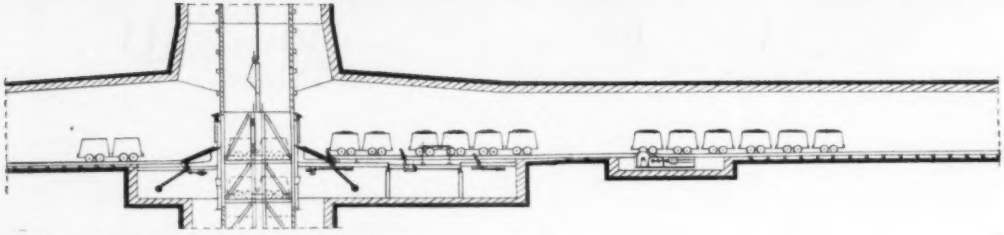
For smartness, speed and precision there is nothing like the R.P. chain.
One half-turn with the tommy bar and the pick is locked in the return cutting position.
Seconds instead of minutes. It's as easy as that.

Write for broadsheet:

AUSTIN HOY AND COMPANY LIMITED
STATION WORKS · SAUNDERTON · HIGH WYCOMBE
Telephone: NAPHILL 2333 · Grams: MULTIHOY · HIGH WYCOMBE

R.P.2





SAFE, EFFICIENT, ECONOMICAL MINE CAR DECKING CIRCUIT

Complete tub decking plants, compressed air or electro-hydraulically operated, are an important feature of Dollery & Palmer's activities in the production of modern mining equipment. These plants are absolutely safe and guarantee high efficiency and economy. In addition to tub decking equipment we supply shaft safety equipment. If the cage is not at its correct level the control valve remains locked and the equipment cannot be operated; thus any possibility is eliminated of tubs being pushed into the shaft.

DOLLERY AND PALMER LTD

54 Victoria Street, London, S.W.1.
Telephone: VICtoria 2494 (3 lines)
Lydgate Lane, Sheffield 10. Sheffield: 64516

Britain's leading iron and steel companies use SMITH

Cranes

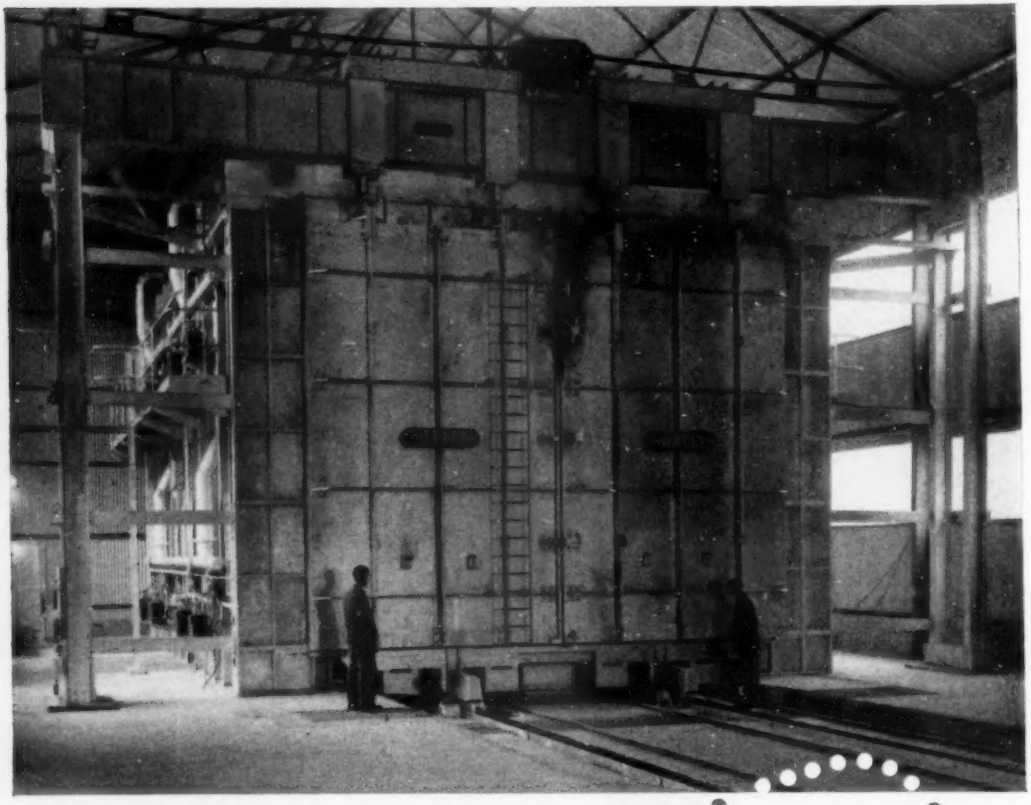
to get effective handling at lowest cost.

Iron and steel producers and stockholders use SMITH CRANES to handle material in the scrapyard and the stockyards. A typical example is this 7-ton capacity Smith diesel-electric loco crane shown working with magnet equipment.

Thomas Smith & Sons (Rodley) Ltd.

Crane and Excavator Works, Rodley, Leeds

Tel: Pudsey 2844 (5 lines). Wires: Smith Rodley Telex (Telex No. 55105).



By kind permission of
Messrs. John Thompson Ltd., Wolverhampton

GIBBONS

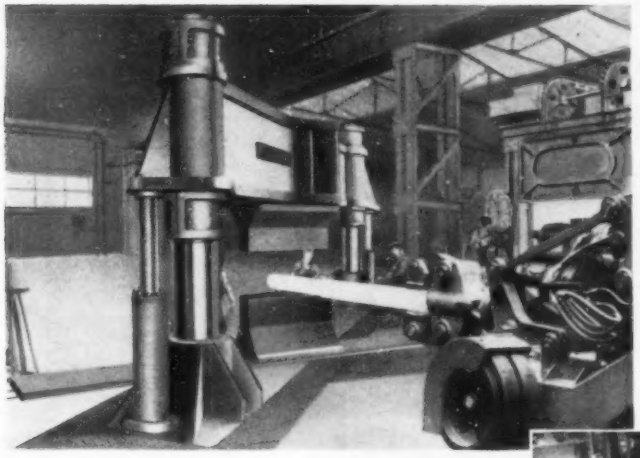
Oil fired Bogie Type Stress Relieving and Annealing Furnace

***GIBBONS BROTHERS LTD** · P.O. BOX 19, DIBDALE · DUDLEY WORCS.*
TELEGRAMS · "GIBBONS, DUDLEY" *TELEPHONE · DUDLEY 55141 (PBX)*

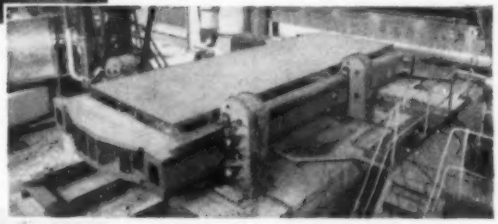
FIELDING

ENGINEERING SERVICE—

to the STEEL WORKS of the WORLD



FIELDING 1500 tons High Speed Two Column Pull Down Forging Press operating from a direct pumped Oil system. This design of press offers all the advantages of reduced head-room, increased stability, greater accessibility and the controls which are designed for either hand or automatic operation are suitable for integrated manipulator control.



A typical FIELDING 200 tons Self-Contained Hydraulic Furnace Pusher operating in a leading British Steel Works. Smooth build-up and release of hydraulic pressure is a particular feature of FIELDING Pushers resulting in reduced hearth wear.

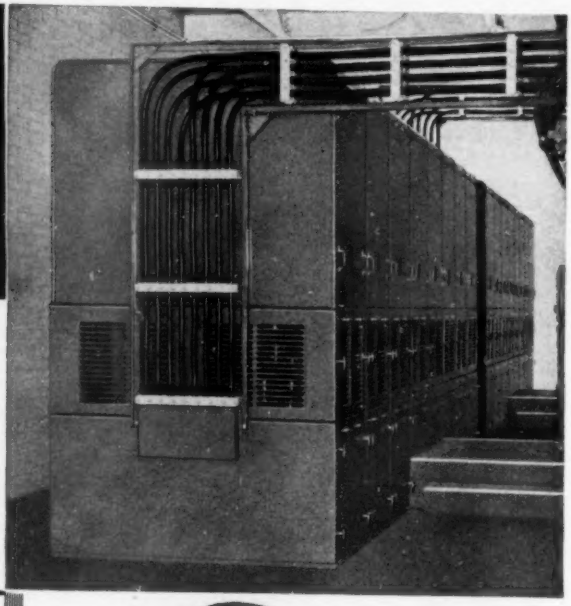
This FIELDING Triple-Action Scrap Metal Baling Press produces bales weighing two tons each and machines of this type are installed in many of the larger Steel Works. A Wide range of FIELDING Scrap Presses capable of producing bales from 1 cwt. upwards is also available.

Other FIELDING Steel Works equipment includes Air Hydraulic Accumulators, High Pressure Pumps, Gag and Straightening Presses, Piercing Presses and in fact, any type of special heavy hydraulic equipment required by this industry.

FIELDING & PLATT LTD. *Engineers,* **ATLAS WORKS, GLOUCESTER ENGLAND**

Telephone: Gloucester 20351 (6 lines) Telegrams: Atlas Gloucester Codes: A.B.C. 5th. Bentleys A.1

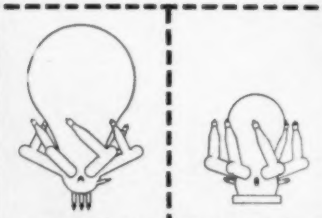
HEWITTIC Cooled-Cathode RECTIFIERS



Increased output -less space

The Hewittic cooled-cathode rectifier is essentially compact and provides a very high capacity within a given floor area.

Right: Two Hewittic cooled-cathode rectifiers forming a 5000 kW bank in the Dover Substation British Railways, Southern Region:



CONVENTIONAL | COOLED-CATHODE

- Smaller size (see comparison between conventional and cooled-cathode bulbs of same capacity above).
- Improved efficiency at lower voltages.
- Dependability of bulb maintained.
- Ease of installation and maintenance.

Send for publication R192/1

750 kW 3000 volt Hewittic cooled-cathode rectifier bulb

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD.

WALTON-ON-THAMES - SURREY - ENGLAND

Telephone: Walton-on-Thames 28833 (8 lines) Telegrams & Cables: "Electric, Walton-on-Thames"

- Trouble free tracking.
- Maximum resilience to the belt under all conditions of load.
- Easy to sling.
- Compact and light.
- Quickly erected.

new

CUSHION MOUNTED SLUNG IDLERS ON TUBULAR FRAMEWORK

Sutcliffe tubular framework has been designed to give resilience to the belt under all conditions of load. The automatic variation in depth of trough reduces dangers of belt damage and degradation. Easily and neatly packed, simple and speedy to erect—it retains the quality and strength characteristic of Sutcliffe equipment.

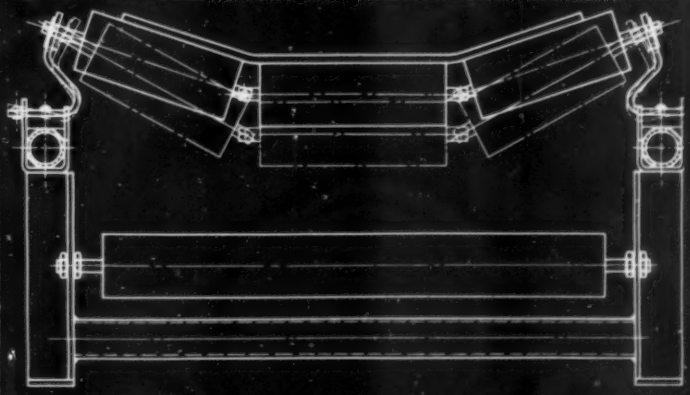
RICHARD SUTCLIFFE LTD. HORBURY WAKEFIELD

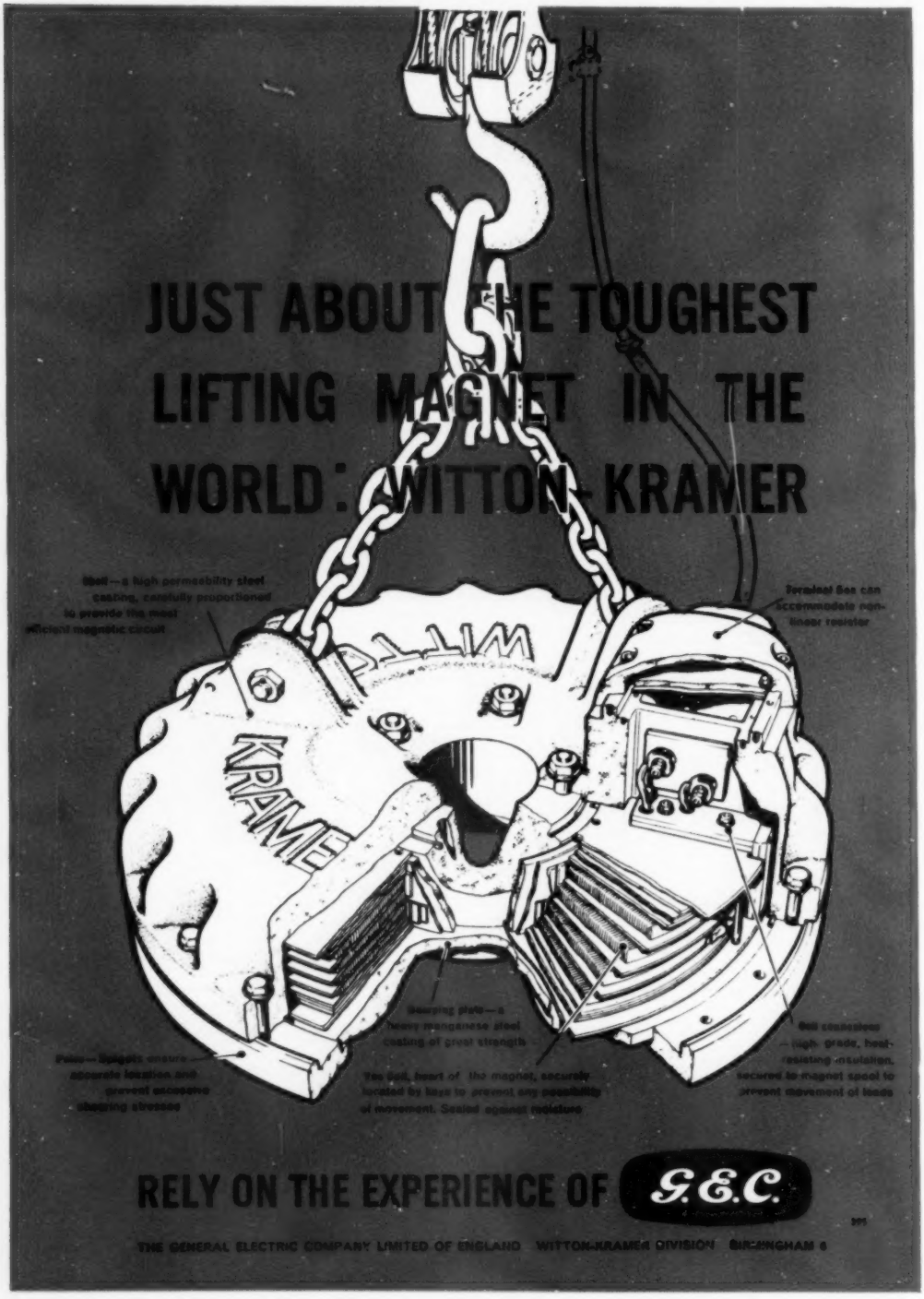
Sutcliffe

Britain's Best Conveyors

We shall be pleased to send you full details. Please quote ref: IR /147.

- Bottom belt clearly visible.
- Low in height.
- Wing rollers securely locked in supporting brackets.
- Assists in conveying against gradients.
- Idlers and rollers can both be tracked.




JUST ABOUT THE TOUGHEST
LIFTING MAGNET IN THE
WORLD: WITTON-KRAMER
Shell—a high permeability steel casting, carefully proportioned to provide the most efficient magnetic circuit
Toroidal Coil can accommodate non-linear resistor
Pegs—Dowels ensure accurate location and prevent excessive shearing stresses
Bearing plate—a heavy manganese steel casting of great strength
Pole coil, heart of the magnet, securely located by keys to prevent any possibility of movement. Sealed against moisture
Coil connection—high grade, heat-resisting insulation, secured to magnet spool to prevent movement of leads
RELY ON THE EXPERIENCE OF G.E.C.
THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND WITTON-KRAMER DIVISION BIRMINGHAM 6

With the Hanmade Anti-breakage Storage Bunker haulage breakdowns, derailment or shaft hold-ups need not stop production. Normally coal can proceed 'straight through" but in the case of bottle necks out-bye of the bunker, production can be turned into the Bunker and unloaded later in the shift. Advantages?
Greater flexibility of output, less coal degradation and increased production.

Requires only one man to operate.

Developed in conjunction with the Mechanization Dept. of Area 1 East Midlands Division of the National Coal Board.

hanmade anti-breakage storage bunker

HANMADE CONVEYOR CO. LTD., WINIFRED STREET, HUCKNALL NOTTS. Telephone 3448/9

The photographs show, above, the new bays at the Blackwood factory and, bottom left, the Transformer Factory at Treforest Trading Estate.

The success of our research, designs, and manufacturing policy in the field of switchgear is clearly indicated by our continuous expansion and the confidence shown in S.W.S. products throughout the world. The fact that S.W.S. equipment is repeatedly 'first choice' confirms this confidence and an expanding organisation such as ours needs more space to meet the consequent ever-growing demand for our products. The current building programme includes factory and office extensions, a new research and laboratory block and a new transformer works.

SOUTH WALES SWITCHGEAR LIMITED

BLACKWOOD · MONMOUTHSHIRE · WORKS AT TREFOREST AND BLACKWOOD

SWITCHGEAR · FUSE-SWITCHGEAR · TRANSFORMERS · CONTROL BOARDS

SW 26

ENGINEERING MARINE WELDING & NUCLEAR ENERGY EXHIBITION

THE LARGEST EVENT OF ITS KIND IN THE WORLD

Olympia · London
April 20-May 4 1961

For full details write to the organisers:

F. W. BRIDGES & SONS LTD.

Grand Buildings, Trafalgar Sq, London, W.C.2

Fifteenth century carving in St. Leonard's Church, Ribbesford, of a pig playing the bagpipes, with a sow and litter, and two pigs reaching for acorns. Photograph by Ruth Meyler & F. C. Sillar

50 MILLION PIGS GO TO MARKET!

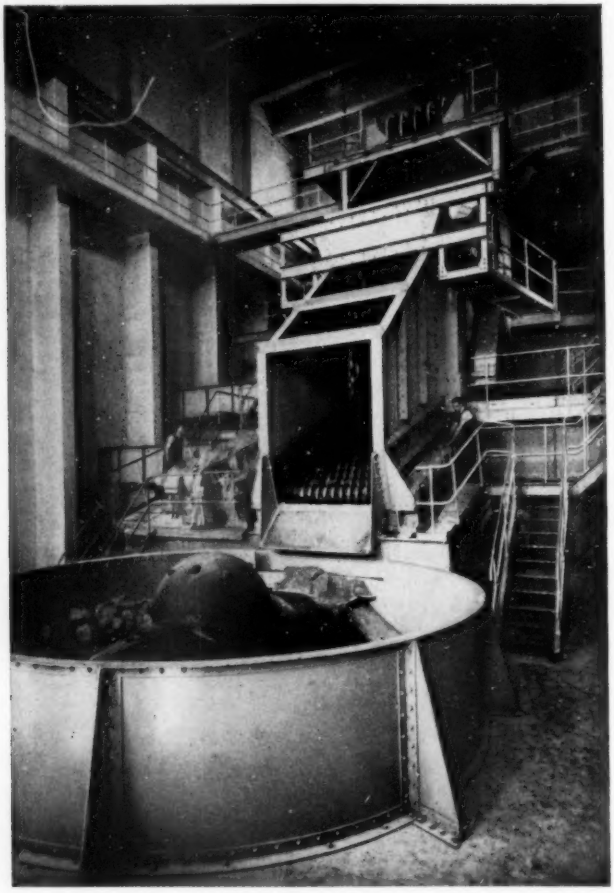
In the early days of the industrial revolution manufacturers frequently looked for familiar and easily recognisable descriptions of their products. To the countryman transplanted into industrial surroundings nothing was more familiar than a pig; a fact which is emphasised by carvings in scores of old churches depicting pigs suckling their litter, rooting for acorns and playing the bagpipes. (Apparently this last pastime was forsworn by pigs many years ago because of unpleasant associations between bagpipes and pigs bladders.) Consequently, when iron from Blast Furnaces was directed into long troughs and from there into short and narrow troughs placed at right angles, a resemblance to sows suckling their appendaged litter led to the description of 'pig iron'.

This series of advertisements illustrates some of the 'ecclesiastical' pigs and emphasises the 50,000,000 'special' pigs which Warner and Company have supplied to Iron Foundries producing High Duty Castings.

WARNER WARNER WARNER

"Pioneers of Refined Pigiron"

KA WARNER & CO. LTD., MIDDLESBROUGH



Ross Plant incorporating 54" gyratory crusher—
Hope Cement Works of G. and T. Earle, Ltd.

MATERIAL HANDLING WITH

ROSS

— Complete material handling plants for ore, stone, coal, slag, etc.

— Plants for primary, secondary and tertiary crushing; screening; wagon handling; stocking and re-claiming.

— Services for site survey, planning and layout; detail design; erection; and commissioning.

ROSS ENGINEERS LIMITED, 11 WALPOLE ROAD, SURBITON, SURREY

Telephone: Elmbridge 2345

ROSS SCREEN & FEEDER CO., WESTFIELD, NEW JERSEY, U.S.A.

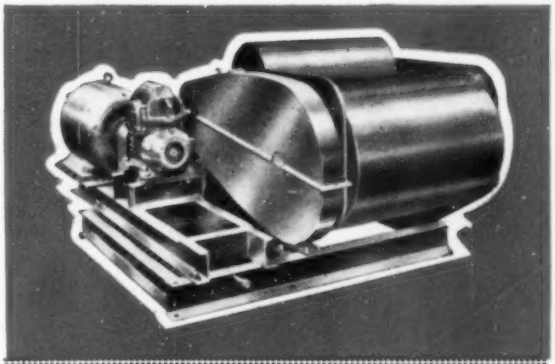
CANADIAN LICENCEES : DORR-OLIVER-LONG LTD., ORILLIA

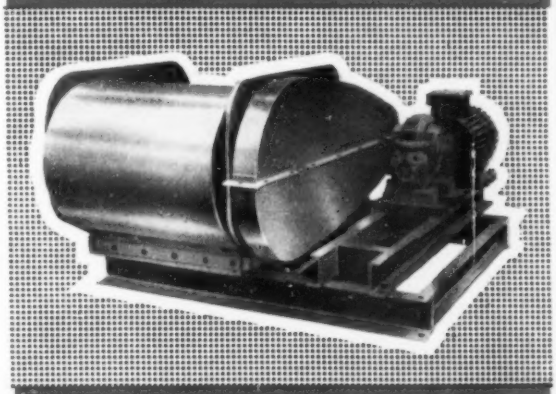
C2/1

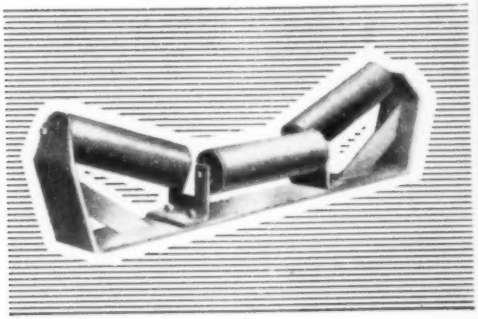
A REPUTATION REPEATED-

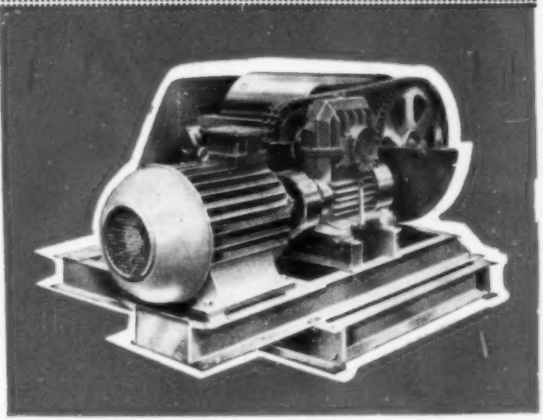
The reputation of Huwood Conveyors underground stands second to none, but not everyone knows, that Huwood Conveyors are now making another reputation in surface application. Whenever surface reconstruction is being contemplated they are worth considering – and specifying – for they can make yet another substantial contribution to mining progress. Incidentally, Huwood idler sets are very readily adaptable to any type of structure.

One or more of the heads shown on this page are sure to suit your special conditions. The idler set in its various sizes will suit everybody.









HUGH WOOD & CO. LTD.

Head Office and Factories:
GATESHEAD-ON-TYNE, 11.
Telegrams: Huwood Gateshead. Telephone: Low Fell 76083 (5 lines).

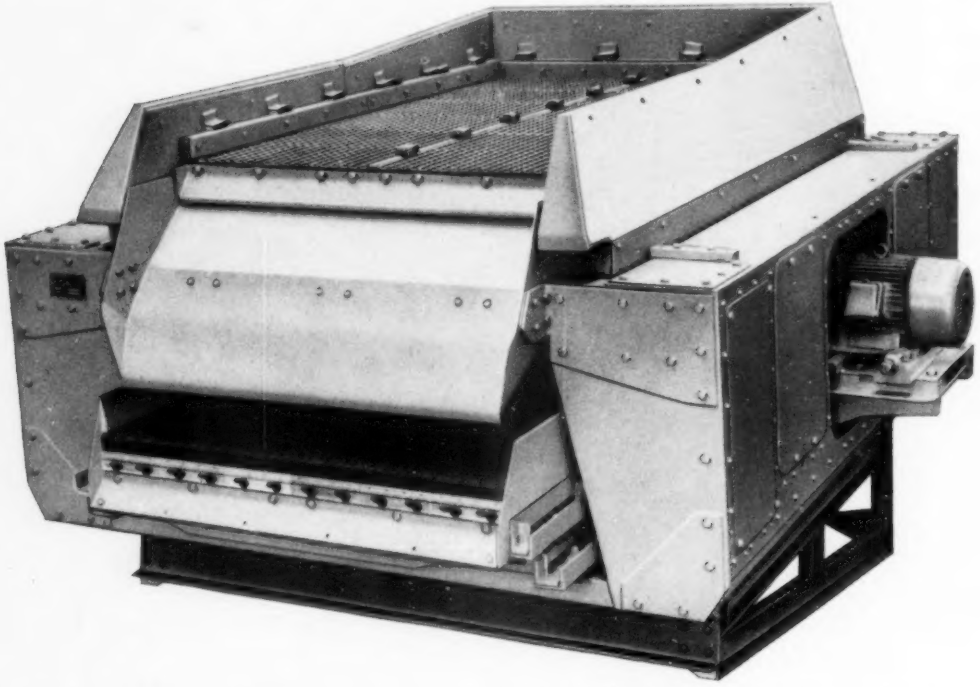
Industrial and Export Office:
ROYAL LONDON HOUSE, FINSBURY SQUARE, LONDON, E.C.2.
Telegrams: Huwood Stock, London. Telephone: Monarch 3273 (4 lines).

TB/FA 189

UMBRA

(VICTOR HALSTRICK KG. HERNE)

FINES EXTRACTION SCREENS



The only Fines Extraction Screens which POSITIVELY CANNOT "BLIND"

Size separation as low as 1 mm. can be effected on any coals—regardless of moisture content.

★ WITHOUT HEATED DECKS

★ WITHOUT RESONANCE

The introduction of the "UMBRA" Screen opens new lines of approach to many screening problems.

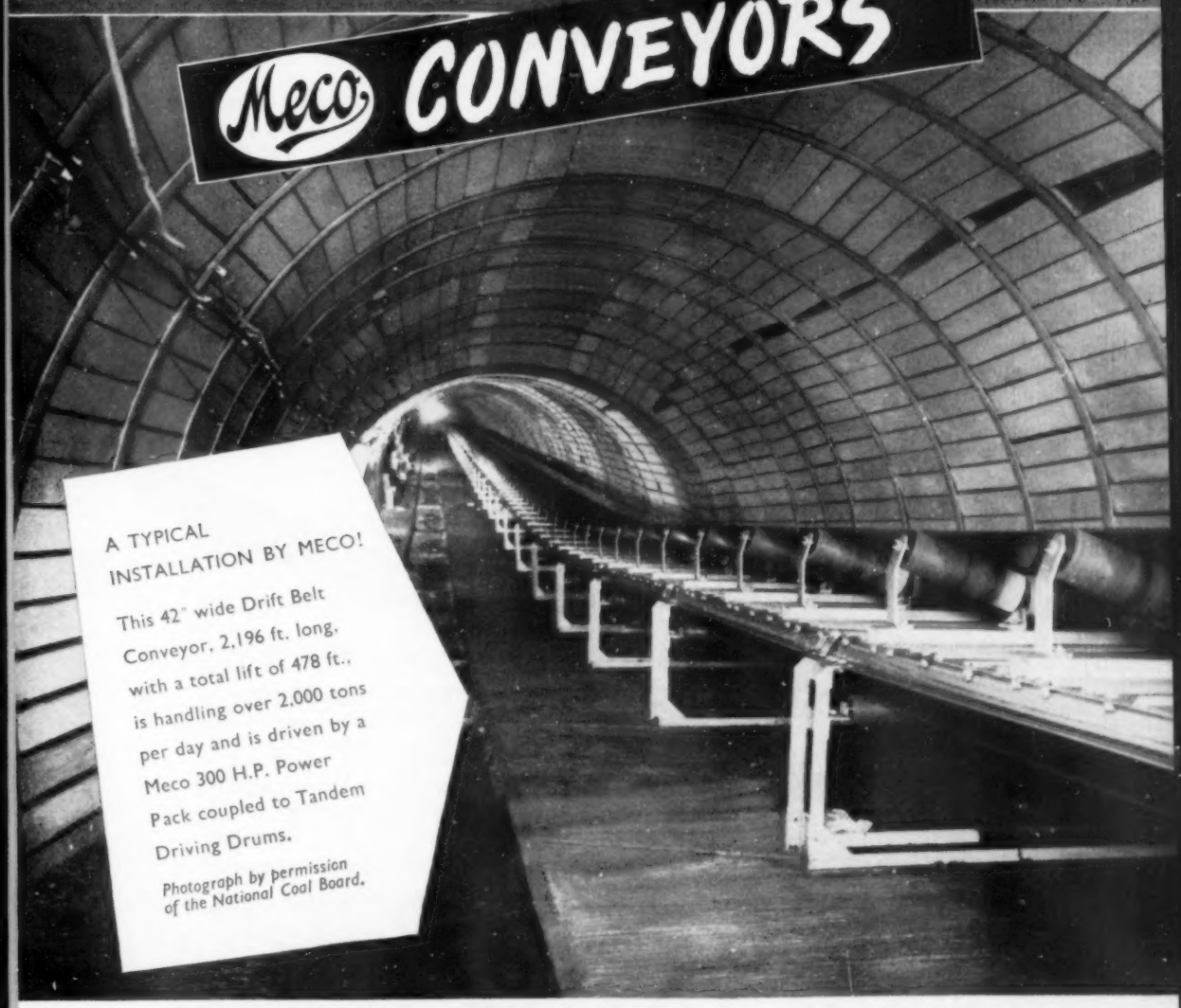
Sole Manufacturing and Sales Licensees for the United Kingdom:

NORTONS-TIVIDALE LTD.

TIVIDALE · TIPTON · STAFFORDSHIRE *Telephone:* **Tipton 1201**

NOW! MAJOR DRIFT TRANSPORT BY—

Meco CONVEYORS



A TYPICAL INSTALLATION BY MECO!

This 42" wide Drift Belt Conveyor, 2,196 ft. long, with a total lift of 478 ft., is handling over 2,000 tons per day and is driven by a Meco 300 H.P. Power Pack coupled to Tandem Driving Drums.

Photograph by permission of the National Coal Board.

THE MINING ENGINEERING CO. LTD.,
MECO WORKS, WORCESTER, ENGLAND.

Telephone: Worcester 22291 (7 lines).
Telegrams: MECO Worcester.
London Office: 50 Pall Mall, London, S.W.1.
Telephone: Trafalgar 4686/7.
Cablegrams: Mecomonde, Piccy, London.

L.P. 210—110

LINDLEY

DEEP HOLE WATER INFUSION INSTALLATION

All types of coal infused with pressures up to 4,000 lbs. P.S.I.

1 ¾in. Lindley Minor Valve ½in. bore
2 Portable Lindley Water Meter and Gauge Unit
3 Lindley Standard Minor Valve and Relief Valve Assembly
4 1 length ½in. H.P. double wire braid Hose
5 Lindley H.P. Deep-Hole Infusion Gun Type I

Normal full week's production infused in one shift. One gun to 40 yards of face.

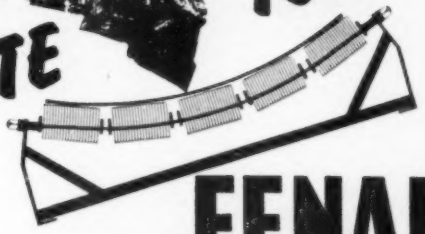
DUST COUNTS REDUCED 50%. GREATER PRODUCTION ON MECHANISED FACES

THIS EQUIPMENT IS ALSO BEING USED SUCCESSFULLY FOR: IMPULSE FIRING · MILLI-SECOND DELAY BATTERY IMPULSE FIRING NORMAL WATER · INFUSION WORK

H. LINDLEY LIMITED

DEANSTONES WORKS, DEANSTONES LANE, QUEENSBURY, Nr. BRADFORD
Telephone: QUEENSBURY 2292/3

ELIMINATE TORN BELTS!



WITH **FENAPLAST**

DIAMOND TYPE CONVEYOR BELTING

YOU CAN BE SURE THAT FENAPLAST DIAMOND BELTING DOES REDUCE BELT COSTS, BECAUSE:

- All-nylon carcass eliminates any possibility of tearing;
- Complete plastic impregnation makes it impervious to water;
- Solid woven, there are no problems of ply separation.

SPECIFY FENAPLAST DIAMOND TYPE AND BE SURE

RANGE OF DIAMOND TYPE BELTINGS AVAILABLE				
N.C.B. APPROVAL NO.	158	149	158	149
TYPE	DIAMOND	DOUBLE DIAMOND	HEAVY DIAMOND	EXTRA HEAVY DIAMOND
BREAKING LOAD MINIMUM PER INCH WIDTH	2000 LB	2500 LB	3000 LB	4000 LB
THICKNESS	8 mm	8 mm	8 mm	9 mm

J. H. FENNER & CO. LTD. HULL

LARGEST MAKERS OF V-BELT DRIVES IN THE COMMONWEALTH

re-covering DRUM FILTERS?

Fit in one operation the latest **"United"** wirecloth panels joined to give any required width with the heavy duty ***FREE-FLOW*** butt seam which **Retains The Aperture Characteristics Of The Cloth**

* Cloths tailor made to fit any drum in one width
* No overlaps to interrupt screening area and cause uneven caking
* The "Free-Flow" seam gives a single width square-woven cloth with high screening area, providing rapid de-watering of cake
* Extensive use over the last two years has proved the strength and durability of the seam

Special re-covering service for sectors on all types of disc filters

Large and comprehensive stocks held in Edinburgh, Newcastle and London

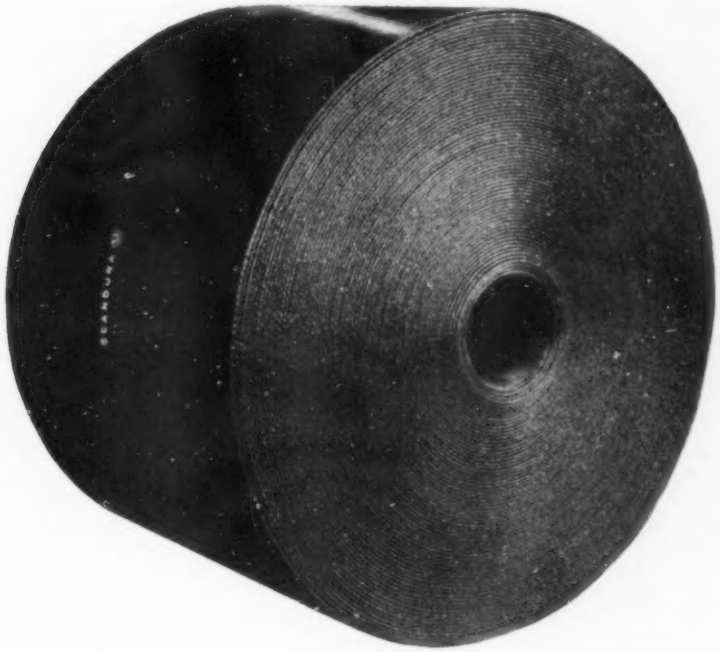
THE UNITED WIRE WORKS LTD

HEAD OFFICE and WORKS: EDINBURGH 5.

Branch Works: Brinkburn Street, Newcastle upon Tyne 6.

Telephone: EDINBURGH 83245-8 84226-7 LONDON MONarch 7249/7240 NEWCASTLE 659191

P6089



SCANDURA

the accepted name in mine conveyor belting

On the first length of plastic covered belting ever to be installed in a coal mine, you could read the name ' Scandura '. That was in 1948 and ever since then more and more mines have been replacing their belts with Scandura. These years of manufacturing experience have helped to make Scandura Gold Line the finest belting of its kind available anywhere.

MANUFACTURED BY THE BELTING DIVISION OF **BBA**

BRITISH BELTING & ASBESTOS LTD · CLECKHEATON · YORKSHIRE

SOME GET IT ROUGH...

The steel-making industry demands a crane of rugged construction, designed and built for continuous and arduous duty. Whartons employ a technical staff capable of interpreting the demands of the steelmaker, and designing cranes to B.I.S.R.A. specification.

The specialised staff employed is available during preliminary negotiations to ensure that the complete installation is exactly to the requirements of the customer.

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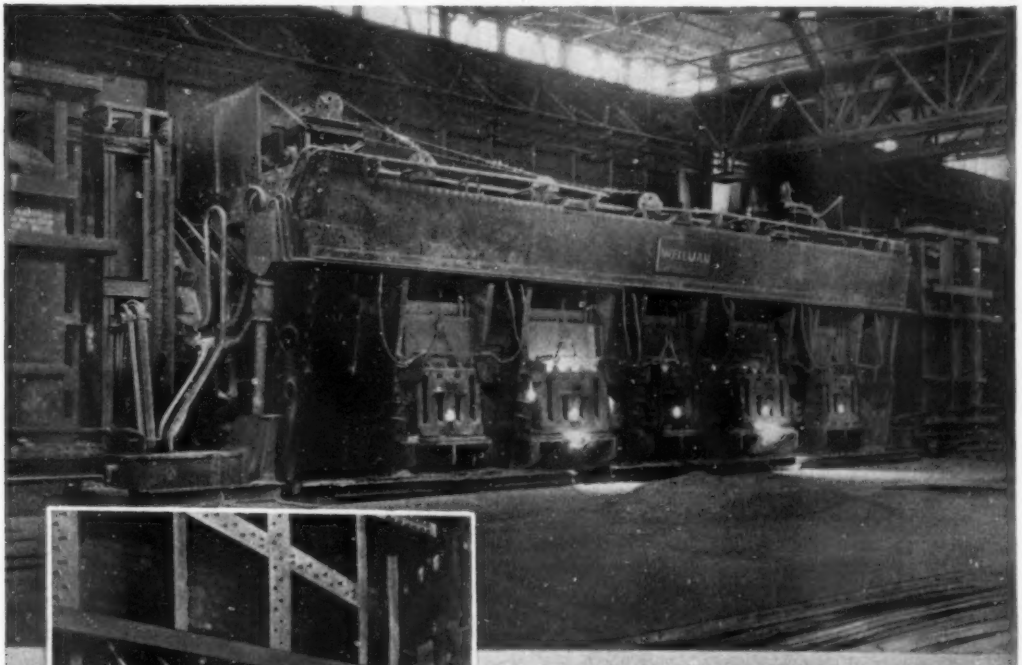

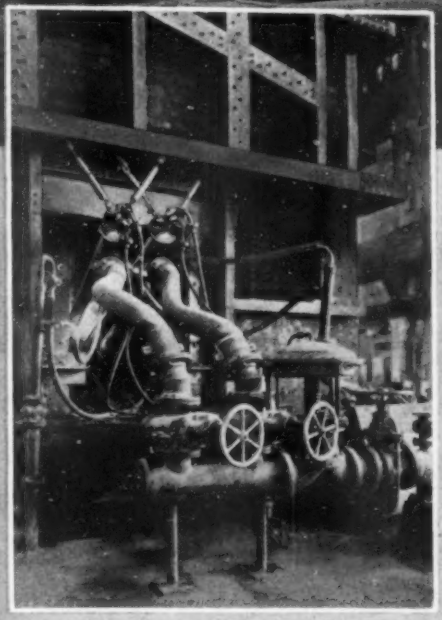

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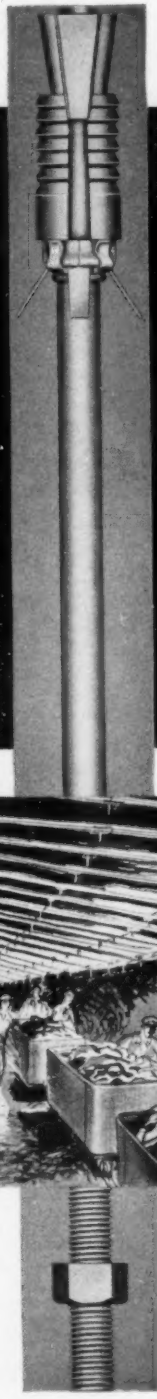

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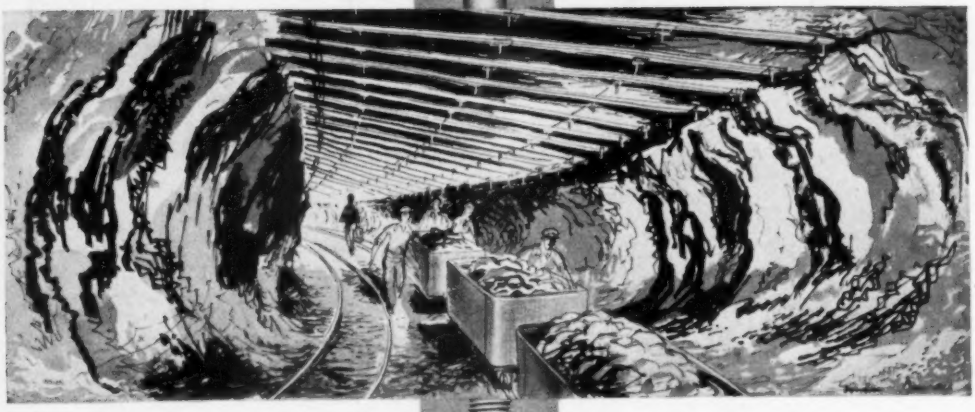

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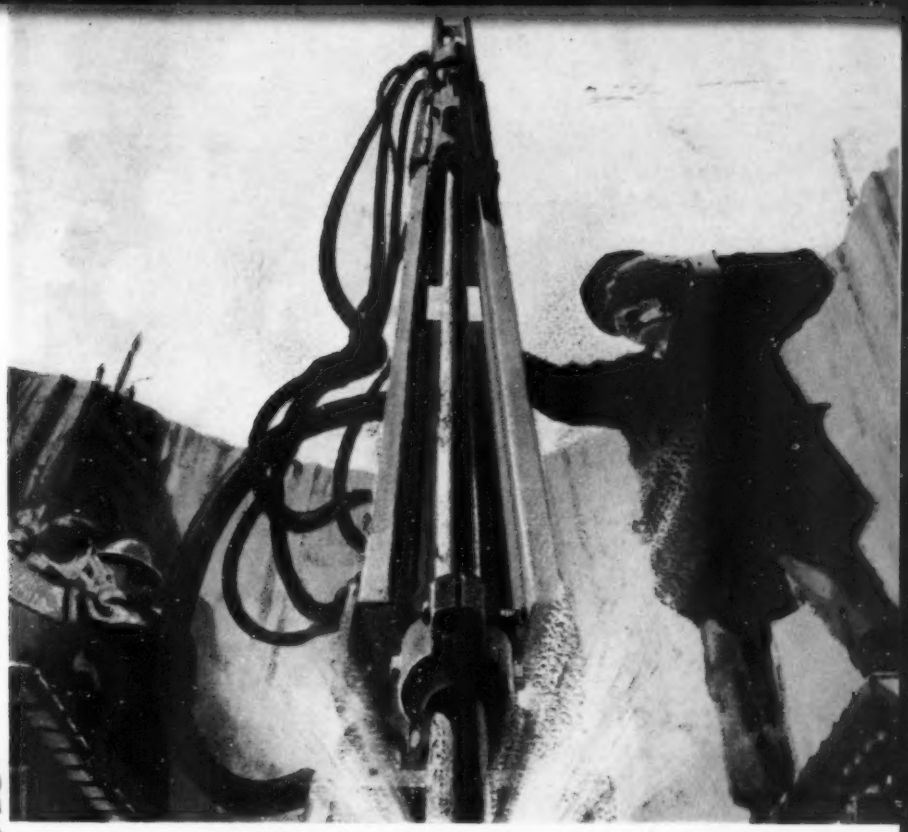

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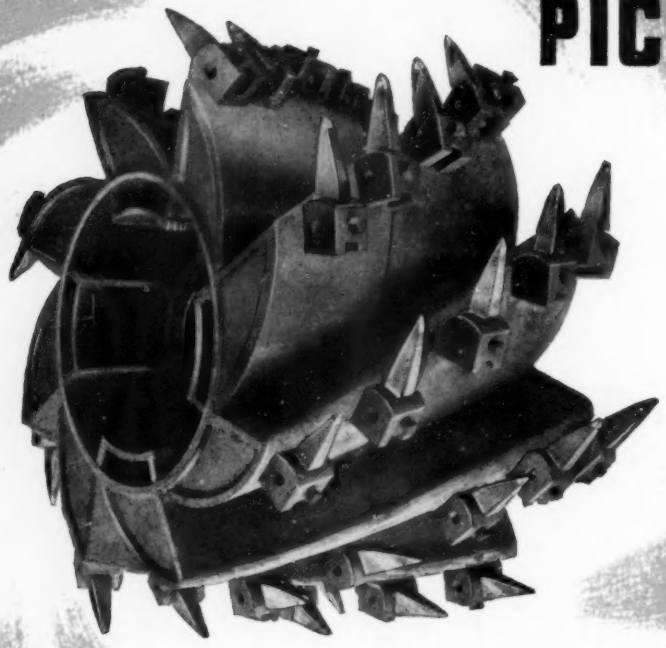

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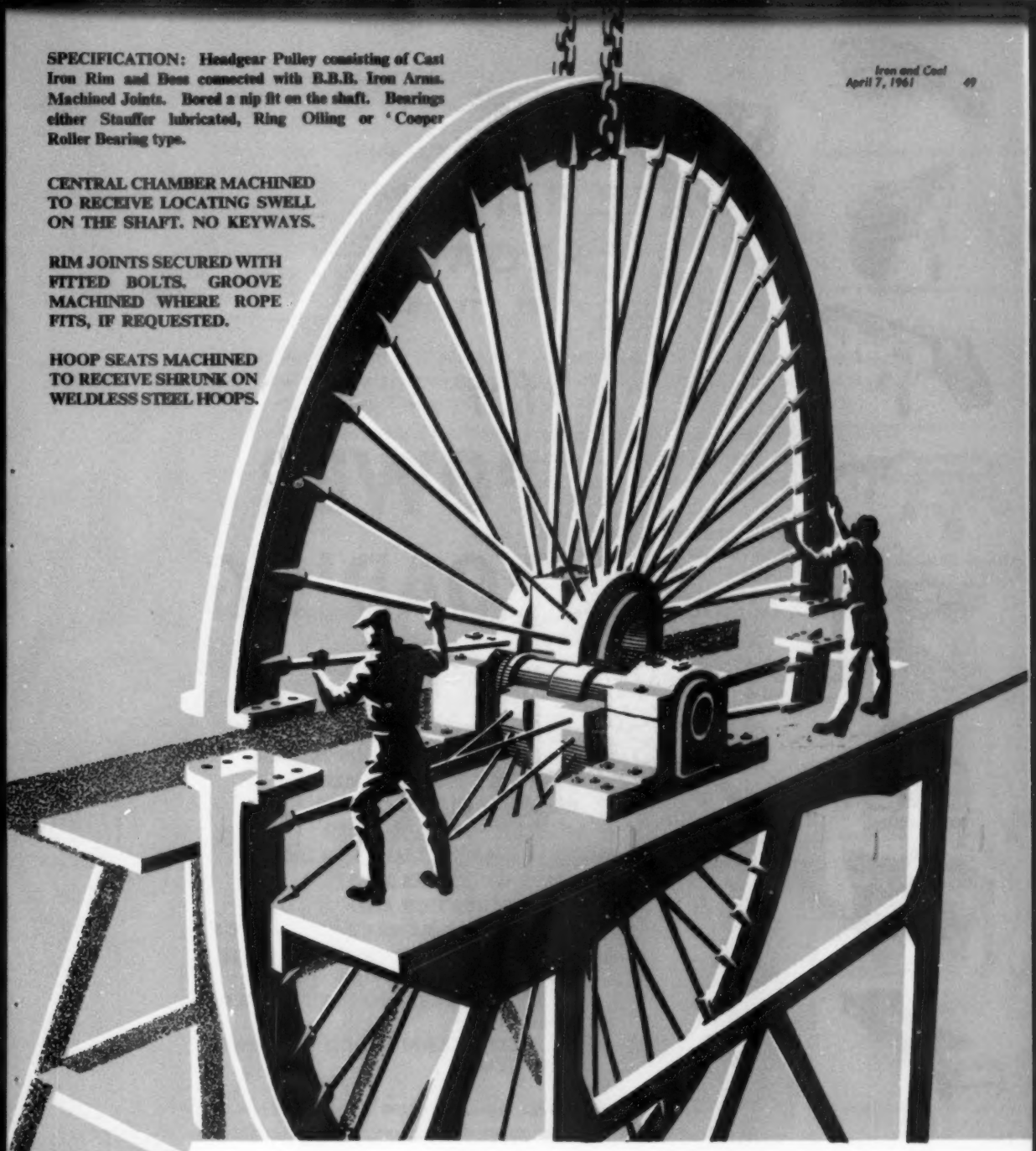

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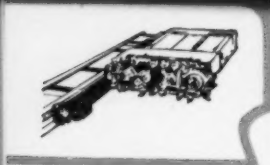

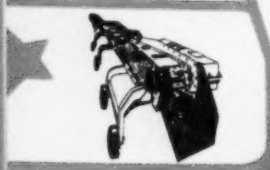

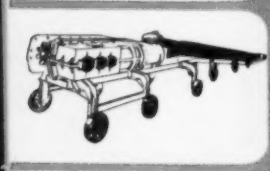

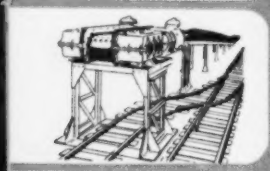

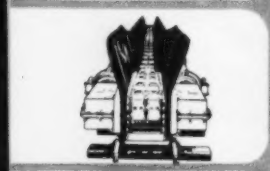

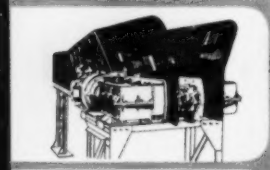

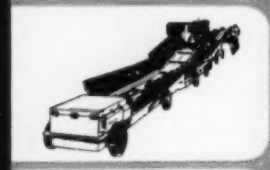

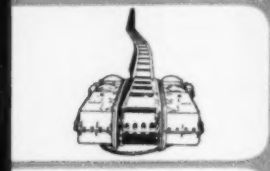

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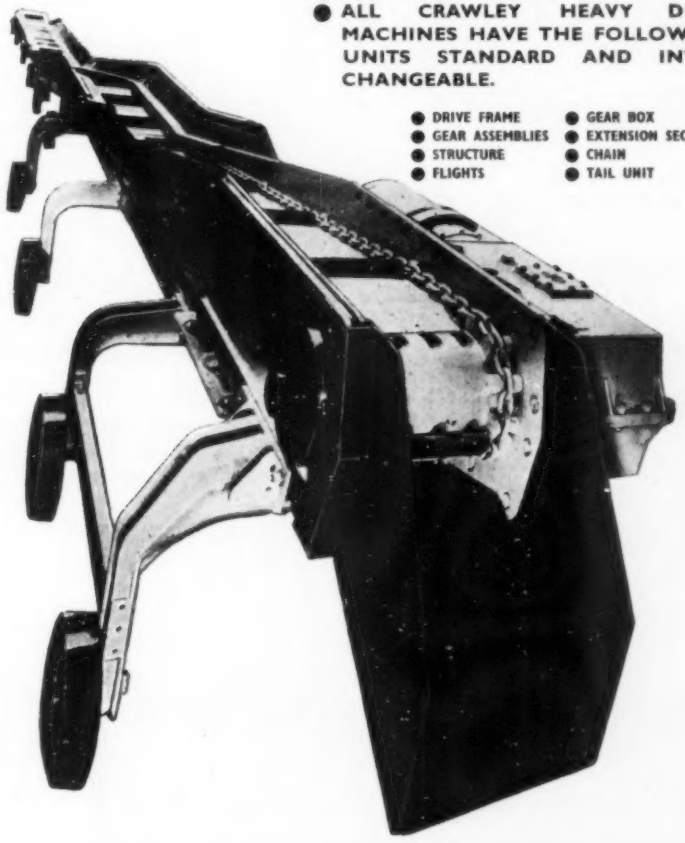

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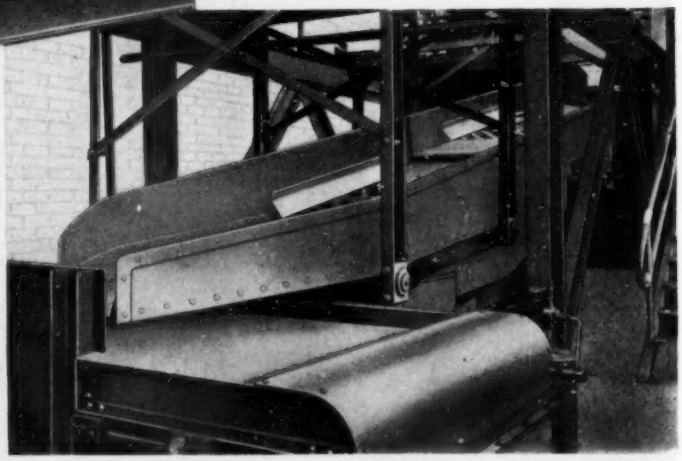

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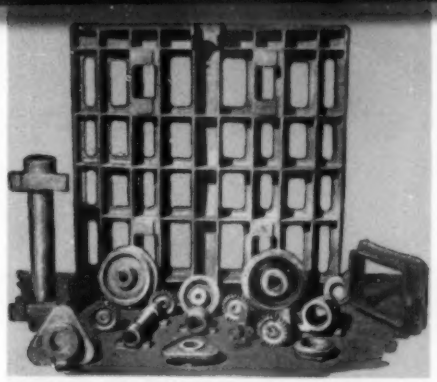

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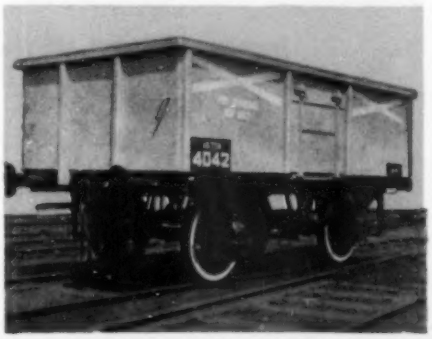

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Vol. 182
No. 4838

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THE IRON AND COAL TRADES' REVIEW

APRIL 7
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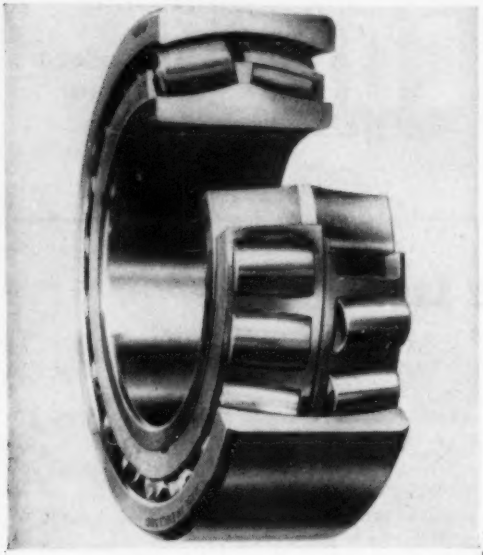
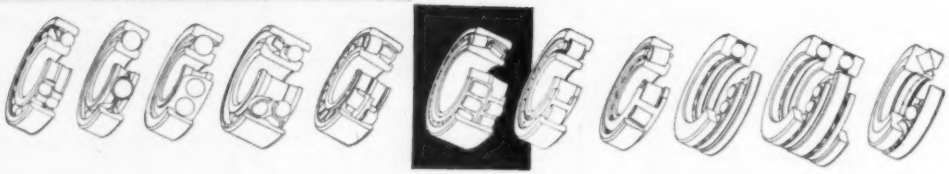
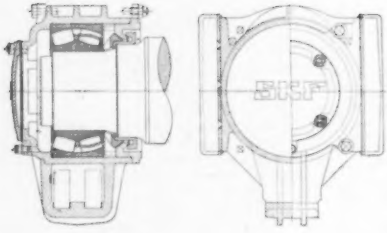


Only SKF can offer such a wide selection of British-made bearings





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And it's British!

AT a conference in London on Wednesday the chairman of the National Coal Board, Mr. Alfred Robens, launched what he described as "the most massive sales campaign in the history of the coal industry." Coal has had a fight on its hands since the coal markets began to evince the first perceptible signs of change way back in 1956. Gradually the industry emerged from the seller's market it had enjoyed for so long, and to which it has probably said goodbye for ever. The battle has become steadily more intensified as oil has widened its encroachments into coal's preserves. Last year brought signs of better times for coal. During 1960 the National Coal Board sold 10,000,000 tons more than in 1959. During the first 11 weeks of this year it has lifted from stock nearly 6,000,000 tons. But the fight is still on, and Mr. Robens, in a fighting speech, made clear beyond any doubt that the NCB intends to throw into it all the effort it can muster and all the resources that are at its command. "We intend to sell coal as it has never been sold before. We have the smell of success in our nostrils," he said.

Mr. Robens advanced no grandiose scheme for a vast expansion of the coal industry. The board's view of the future is that the industry should aim at producing and selling 200,000,000 tons of coal a year. It accepts that there can be no guarantee of selling within such rigid limits, but 200,000,000 tons is the target. The necessary flexibility will be provided year by year by putting coal to stock when demand falls below production and drawing from those stocks when the market takes a turn for the better.

The reasons for the sales drive are obvious. As Mr. Robens explained, the industry has been losing business to oil, and is having to fight hard, not only to develop new markets, but to hold on to its existing customers. In support of the sales drive the NCB is embarking on a wide publicity campaign. Ultimate success, however, as in the case of all advertising campaigns, depends on the product. What has Mr. Robens to offer to the consumer? The board has adopted a new slogan: "Solid Fuel —More Heat at Less Cost—And it's British." It is, therefore, basing its appeal partly on patriotism, or, rather, on the virtues of self-help. The board's view as expressed by Mr. Robens is that it is vitally important to the nation as a whole as well as to those employed in the coal industry that the campaign should succeed. A healthy, efficient coal industry is essential for national prosperity. The industry has an annual turnover of almost £900,000,000, and 8 per cent. of the people of Britain are dependent directly on coal for a livelihood.

But coal has to be sold on something more tangible than purely national considerations. This Mr. Robens realizes fully. As he put it, "the industrialist has to watch his costs and the householder wants to stretch the weekly wage packet." It is the ability of solid fuel to fulfil the claim that it will provide more heat at less cost that will determine the success of the new campaign. Mr. Robens stressed on Wednesday that all the efforts of the board are designed to keep prices stable. To do this it relies largely on increasing further the productivity of the industry. Today's productivity figure of 28.5 cwt. per manshift is the highest ever achieved in the industry. It is hoped to reach the figure of 29 cwt. by the end of the year. An increasing proportion of the country's coal output is now got entirely by machinery. Power-loading now accounts for 44 per cent. of the production, and a target of 50 per cent. has been set to be reached by the end of the year.

The board hopes to eliminate some of the delays encountered in securing deliveries at peak periods of the year by radical alterations in the system of distribution between pit and factory and pit and merchant's depot. The aim in future will be to get the coal quickly away from the pits and stock surplus production in the summer at power stations and gasworks and on factory stocking grounds. In the case of the domestic market it is hoped not only, by judicious advertising, to persuade the householder to hold larger stocks, but also to lay down extensive supplies at railway depots and other strategic points from which merchants can draw tonnage as required. The board also promises to pay still greater attention to quality. It claims that already it cleans mechanically nearly 120,000,000 tons of coal a year, and additional plants are being put down to clean another 34,000,000 tons, which will mean that nearly three quarters of the total output will be cleaned mechanically.

To the industrialist the message beamed out by the National Coal Board is that coal, burned in modern equipment, is cheaper than other fuels and just as convenient to use. To advise users on the best way to get the best out of coal it is perfecting the technical advisory service it set up some time ago. To the householder the message is that solid fuel can provide more heat at less cost in the home as well as in the factory. Part of its cam-

paign in the domestic sphere involves a separate central heating drive.

Mr. Robens was as at pains to emphasize that the new campaign is a joint drive involving everybody in any way connected with coal. The board has the support of the trade unions in the industry. The Coal Utilisation Council, coal merchants, appliance manufacturers and distributors, heating engineers, the British Coking Industry Association, and the Solid Smokeless Fuels Federation will all be taking part. The board is launching an all-out effort calculated to bring fresh heart to the men engaged in the industry and to the many others who work with and live by coal. If it can instil in the public mind some part of the confidence and determination evinced by the chairman in announcing the new campaign the board may well inaugurate a new era for the coal industry and coal trade of this country.

Durgapur Steelmaking Plant Completed Ahead of Schedule

WITH the completion of testing of the 100-ton open-hearth furnace, the final unit of the melting shop, all the steelmaking facilities at Durgapur Steelworks, West Bengal, have now been installed. The work has been completed well ahead of schedule. Three furnaces went into production last year and dates for the commissioning of the others remain to be fixed.

The steel melting shop consists of seven open-hearth furnaces of 200-ton capacity each and the 100-ton furnace which has been designed for the specific purpose of producing special steels for the manufacture of wheel sets for the Indian Railways.

The steelmaking plant, which embodies the most up-to-date layout, will produce 1,000,000 tons of ingot steel per year in full production. It was designed and built by a member company of ISCON—the Indian Steelworks Construction Company, Limited—the consortium of British companies responsible for the construction of the steelworks.

NEW LIMESTONE QUARRY TO SUPPLY COLVILLES

TO supply its blast furnaces, Colvilles, Limited, Glasgow steelmakers, is to open up a limestone quarry on a stretch of moorland at Shap (Westmorland). Preliminary work is being done by John Laing & Son, Limited, and it is expected that, in spite of unusual difficulties, the quarry will come into operation by September.

Work involved includes the construction of two miles of access road, two railway sidings, the foundations for crushing and screening plant and storage hoppers, office accommodation, etc., and a magazine to take 20,000 lb. of explosives.

TWO NEW factory buildings have been acquired by Adrema, Limited, addressing machine makers, of London, W.3, to form their first satellite plant of 20,000 sq. ft. on the Bilton Estate, Portsmouth.

Passing Thoughts . . .

THERE appear to be too many instances in this country where the same small group of scientists has to function both as research team and design team, and the skills and interests required for the two tasks are not identical. The best hope of solving the problem of increasing quantity and quality of personnel in industry lies in better guidance of young scientists and engineers both in steering some of them into industry and in developing their abilities when they are in.—Letter in The Times.

> *Might it not be possible to combine good neighbourly economics with good internal management of the economy by a special government scheme to buy old machinery out of out-dated British factories and ship it off as part of an aid scheme to small manufacturers in underdeveloped countries —who with their genuinely lower labour costs, could economically use it?—The Economist.*

Spokesmen of the Bored of Trade (my spelling), the competent department, frown on any suggestion that tax incentives should be given to encourage new entrants to export trade and yet, surely, the only way to make the small at present non-exporting firm export-conscious is to give it a tax break on its export sales.—Letter in the Financial Times.

> *Unfortunately, too often among traditional miners, open-cast work by civil engineering contractors has been regarded as if it were a piratical act. This is sheer prejudice! After all, what is traditional deep mining other than a civil engineering operation undertaken by the NCB itself? —Letter in the Western Mail.*

As far as it is possible to generalize about the men who make up any industry, we believe that the individual miner is a great person. He is fit, tough, and resilient. He works hard and he plays hard. His working conditions are dirty, dangerous, and unnatural. He is a hard man unworried by danger and unimpressed by authority. It is significant that in the war he was either the best soldier in the regiment—or in the glasshouse. There are no half-measures.—Doncaster Chronicle.

> *There can be no doubt, and no denying, that hundreds of millions of pounds have, since the end of the war, been wasted on misdirected "investment" in the nationalized coal, electricity, and railway industries. . . . There has been plenty of investment, but how much effective growth?*—MR. COLIN CLARK, *Oxford economist, in his Hobart Paper* 10 *for the Institute for Economic Affairs.*

Hawker Siddeley to Withdraw from Nuclear Power Field

DECISION to withdraw from the nuclear power field to a large extent "as a result of the uneconomic trend which has developed in this type of industry," has been reached by the Hawker Siddeley Group, Limited. As a result the Langley (Slough), factory of the Hawker Siddeley Nuclear Power Company, Limited, the main base of the group for all development work on nuclear energy, is to be closed down gradually.

A spokesman for the company said that all commitments undertaken would be fufilled and the shutdown would take place progressively over the next few months.

Limelight for Coal

MR. A. ROBENS LAUNCHES "MASSIVE" CAMPAIGN

MOST massive sales campaign in the history of the coal industry was launched in London on Wednesday by Mr. Alfred Robens, chairman of the National Coal Board; a campaign which he described as "the first shot in the battle" against competition from oil. It was a pretty resounding shot and, he added, "there are more in our locker." Whether these shots are more sales campaigns or the up-to-the-minute developments to keep solid fuel as the major British fuel, he did not say, but the Coal Board appears to have ammunition and to spare.

Two of the heavier calibre shots in the locker should be the board's intention to secure as soon as possible a complete re-vamping of the overall wholesale distribution system, doing away eventually with the winter problem of meeting maximum demand during the period of greatest transport and labour difficulties, and to popularize domestic central heating through a new type of boiler.

MR. ALFRED ROBENS

By means of the closest liaison with makers of solid fuel appliances of every kind and also with the distributors, and also through its own advice and service centres, the NCB intends that the consuming public shall never be in any doubt as to the advantages it can reap through using coal or manufactured solid fuels.

Value to the Nation

Underlining the board's slogan "Solid Fuel—More Heat at Less Cost—and it's British," Mr. Robens reminded the conference of the importance to the national economy of an industry with an annual turnover of £900,000,000. "We pay out £500,000,000 a year in wages—and very little of that is spent in the Persian Gulf," he said. Orders placed with British industry amounted to £250,000,000, and the coal industry was no mean exporter—£30,000,000 a year.

"The nation has invested £900,000,000 in the coal industry since 1947. It is entitled to have its pay off, but it can't get that pay off if the industry contracts further than it is at the present time."

He believed there was a tremendous market for solid fuel in domestic central heating and in this field he believed oil could not touch it. The NCB hoped to have on the market by the autumn a 24-hr. self-igniting, thermostatically controlled boiler.

The problem of winter distribution was recognized. The board would press on with the development of big mechanized depots into which the railways could deliver block trains of coal on a planned service and which could hold substantial stocks. The NCB might well decide to operate one or two more new depots itself. Concentration would be on no stocking at all at pits during the summer, but loading into wagons and stocking at points of distribution. The only problem in the winter should then be the lifting of current production.

"We are reversing all the known habits of the industry in distribution. If we get support from the consumers, particularly the larger ones, we should overcome this problem," Mr. Robens believed. He added: "I am perfectly satisfied that once a start is made and we build up the right tempo, winter shortages will be a thing of the past."

Announcing that latest figures showed that the stock lift now amounted to 6,000,000 tons since January 1, Mr. Robens said that it meant that they were getting production and distribution into balance and that was going to have a very big effect on the finances of the board. He insisted that they must go all out for price stability—"an absolute 'must' for the industry." The only way to meet rising costs of materials, increased wages and salaries, etc., was by increased productivity.

Towards that end greater mechanization was being brought into production. At the end of last year 40 per cent. of output was power loaded. It was now 44 per cent. and if that rate could be maintained the target of 50 per cent. by the end of 1961 was a certainty. OMS was now 28.5 cwt.—the highest in the history of the industry—and by the end of the year could reach 29.00 cwt.

Such an achievement, particularly in the acceptance of mechanization, was due to the tremendous co-operation of the unions. "There is no Luddism in coal mining," he said.

The chairman also referred to another means of "spreading the load" for the consumer and easing a distribution problem by the introduction of "coal on HP." He had given instructions that credit terms should be available where the board sold house coal direct to the public and had discussed with the trade the need to make more widely known such credit facilities.

Asked about colour spraying of coal to indicate its grade, Mr. Robens said the NCB had not yet been approached on the matter. "We can do it, but we don't know who's going to pay for it."

Concluding, he promised an intensification of the advertising campaign which has already made a considerable impact. It would not be confined to industry, but would concern all types of coal and all customers.

During 1960 the NCB sold 10,000,000 tons more coal than in 1959. During the first 11 weeks of this year it had lifted from stock no less than 5,800,000 tons—coal that was being described by the Jeremiahs as "unsaleable" not so very long ago.

Mr. Robens announced that summer prices—a reduction of £1 per ton at the pithead for house coal—would come into force on May 1.

Personal

Sir Ellis Hunter Retires from Executive Posts

CHAIRMAN since 1948, and managing director of Dorman Long & Company, Limited, Sir Ellis Hunter last Friday, retired from all executive appointments in the group, including the joint managing directorship of Dorman Long (Steel), Limited. He will continue as chairman of Dorman Long & Company, Limited, and its principal subsidiaries. As a consequence, Mr. E. T. Judge has been appointed deputy chairman of Dorman Long & Company, Limited, and managing director of Dorman Long (Steel), Limited, of which he was previously joint managing director.

SIR ELLIS HUNTER

Sir Ellis joined the board of Dorman Long as deputy chairman in 1938 and was appointed its chairman 10 years later. In 1945 he became the first chairman of the British Steel Producers' Conference and in the same year was elected president of the British Iron and Steel Federation, a position he held until 1953.

Sir Ellis took a leading part in formulating the Iron and Steel Industry's Plan of Development, which was submitted in 1945 and later approved by the Government and published as a White Paper. He was knighted in 1948 and was made KBE this year.

Mr. R. M. FRASER has retired after more than 40 years as secretary of Fleming Bros. (Structural Engineers), Limited, Glasgow.

Forwarding manager at the Halesowen Steel Company, Limited, Mr. W. E. LAY, has retired. He has been with the firm since September, 1909.

Director of the Industrial Welfare Society since 1950, Mr. JOHN MARSH has accepted an invitation to become director of the British Institute of Management, from October 1.

Director of the Electrical Research Association, Dr. H. G. TAYLOR, who is paying a visit to New York, Toronto, and Montreal, will attend the annual assembly of the International Institute of Welding, in New York.

Chairman and joint managing director of W. J. Jenkins & Company, Limited, makers of coal preparation plant and bulk handling and screening equipment, of Retford, Mr. W. MORLAND FOX, has been elected president of the Mechanical Handling Engineers' Association.

Mr. COLIN COOPER, of John Cooper & Sons, Limited, Sheffield, has been installed as chairman of the Light Edge Tool and Allied Trades Association in succession to Mr. ARCHIE HATTERSLEY, of Ward & Payne, Limited, who has become vice-chairman. Mr. STUART DAVIDSON, of Robert Sorby & Sons, Limited, has been re-elected treasurer.

M. LÉON DAUME, until 1959 a French member of the High Authority of the European Coal and Steel Community, has been appointed High Authority representative to control the practices of the French coal import body, ATIC. This control follows a recent agreement on the body's affairs between the High Authority and the French Government.

Consultant to the Admiralty and other organizations on problems of vibration and strength of material, Mr. WILLIAM KER WILSON has been awarded the 1960 James Clayton prize by the Institution of Mechanical Engineers. The award is made annually to a member or members of the institution who contribute most to modern engineering science.

Miss MARY BERRY, who retired last year as head of the business training department of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, took the chair at the Easter conference of the National Association for Education for Commerce at Whitley Bay. It was the first time in the association's 25 years' existence that a woman has been chairman.

Honorary degree of Doctor of Metallurgy is to be awarded in July by Sheffield University to DR. ULICK EVANS, FRS. Dr. Evans, scientific writer and consultant, has been Emeritus Reader in Science and Metallic Corrosion at Cambridge, and was engaged in research, writing, and teaching at Cambridge for 34 years. He has written a number of papers on corrosion and oxidation.

Mr. JOHN SNOW, deputy chairman and joint managing director of Snow & Company, Limited, machine-tool makers, of Sheffield, has been elected president of the Machine Tool Trades' Association. Col. JOHN HUNT, chairman of Staveley Industries, Limited, has been elected vice-president. Mr. Snow is chairman of the Machine Tool Industry Research Association and a member of the Export Council for Europe.

Next president of the Electrical Research Association is to be Mr. JAMES R. BEARD, senior partner, Merz & McLellan, consulting engineers, of London, S.W.1. Mr. Beard is known internationally for his work in the electrical field and is an honorary member and past president of the Institution of Electrical Engineers. He has headed many of the other learned electrical societies and technical associations.

Colliery Mechanics and Electricians

DRAFT general regulations which it is proposed to make under Sections 141 and 143 of the Mines and Quarries Act, 1954, have been circulated by the Ministry of Power. They will be known as the Coal and Other Mines (Mechanics and Electricians (Variation) Regulations, 1961.

The regulations vary the Coal and Other Mines (Mechanics and Electricians) Regulations, 1956, in two respects. Para. (3) of Regulation 8 of the 1956 regulations provides that no person shall commence work upon certain conductors or in proximity to certain conductors at mines of coal, stratified ironstone, shale, or fireclay, unless certain precautions are taken. Certain types of work are excepted from the paragraph. Regulation 4 of these regulations substitutes for that paragraph a provision creating further exceptions.

Para. (2) of Regulation 13 of the 1956 regulations prescribes the qualifications required by mechanics or electricians for mines of coal, shale, or fireclay who after June 30, 1960, take charge at such mines when the mechanical engineer or mechanic in charge or electrical engineer or electrician in charge is not on duty. Regulation 5 of these regulations substitutes a provision prescribing alternative qualifications for such mechanics or electricians who take charge in such circumstances.

FOREIGN STEEL PROCESSES

Not Necessarily Better Than British

WHILE the demand for steel is clearly rising and has done so for many decades, the rate at which expansion is to take place at least gives the impression that competition for exports, particularly so far as England is concerned, is going to be much keener that it has been in the past. This assertion was made by Mr. Albert Jackson, technical adviser to the United Steel Companies, Limited, at the annual dinner of the Appleby-Frodingham Metallurgical Society.

"All this expansion in other parts of the world obviously demands that the greatest efforts be made to improve the competitive power of our industry," said Mr. Jackson. It was being done, but "a most serious blow" was received last September when the increase in coal prices added directly and indirectly some £19,000,000 to the steel industry's bill.

"Averaged over the ingot, this is about 16s. per ton and probably 25s. a ton average on the cost of material as turned out by our customers," he maintained.

Exhortation all very well

"A large iron and steel company which devised a technical development which would save 16s. a ton of ingots would be most delighted and be prepared to spend several million pounds to achieve such a saving, but here it is gone without the slightest chance of control. It is all very well exhorting people to export, but if prices are not right people will just not buy," he said.

Of steelmaking in Scunthorpe, Mr. Jackson said he would agree that in each case the local steelworks were taking the right way to increase ingot production and reduce ingot costs, having in mind their own raw materials, the products they wished to make, and their present plants. He pointed out: "We have now made upwards of 1,250,000 tons of Ajax steel and have in consequence all information on the costs and capabilities of the process. In our circumstances I believe the process and furnace we invented is more suitable to our former plant conditions, raw materials, and the steel we must make than any of the processes brought from abroad. Larger productions will be achieved from other processes, including the open hearth, on better raw materials. The important thing, however, is the cost of ingots."

He went on: "Taking all this into consideration, I have no doubt that under comparable conditions the other processes have no significant cost advantage over us, while they have, of necessity, less flexibility because of our ability to revert instantaneously to an open-hearth furnace for finishing our product, if we so wish.

"Members of this society can, therefore, press on with further extensions of the Ajax operations knowing that they are in the front line of competitive steelmaking."

THERE were some 350 visitors to the Queen's Works and Biddenham Works of the Bedford engineering firm of W. H. Allen Sons & Company, Limited, on a recent "open day."

Decline in ECSC Steel Export Orders

POSITION of hot and cold rolled sheet on the inland market of the Community at present "leaves much to be desired" according to the High Authority of the European Coal and Steel Community. In export steel markets in general, the position for ECSC steel products has deteriorated during March. Orders have fallen off and prices have sunk, most steel products being sold at export prices from $3 to $5 per metric ton less than quotations extant in early March.

Prices for hot rolled sheet have fallen to $130 per metric ton and those for cold rolled sheet to $132. The Demka concern of Holland has announced general price reductions for ferro-concrete bars of 1.1 per cent., while two Italian works have raised the same prices by from 2 to 3 per cent.

Investment projects laid before the High Authority of the European Coal and Steel Community include plans for a refined steel unit by Deutsche Edelstahlwerke, West Germany; blast furnace installations by the Pompey, France; Mannesman, West Germany, and ARBED, Luxembourg, concerns. Also included are power installations by ARBED, a pit unit by Monopol Bergwerke, GmbH, West Germany, and a pit power station by Saarbergwerke, Saar. The record level of investment reached last year shows no sign of falling.

US-BELGIAN STAINLESS STEEL PROJECT

THE Allegheny Ludlum Steel Corporation, of Pittsburgh, together with the Belgian companies Société Evence Coppée et Cie., SA, Métallurgique d'Espérance-Longdoz, and Compagnie de Ressaix, SA, has set up a joint Belgian producing subsidiary called Allegheny Longdoz, SA, with an initial capital of 50,000,000 Belgian francs. The American company holds half the capital. The company will build a plant at Ghent for the production of stainless and other special steels. Output will be especially for continental Europe.

Espérance-Longdoz also announces the laying at Chertal, near Liège, of the foundation stone for a new steelworks and rolling mill, to cost about 4,000,000,000 Belgian francs. The mill will produce plate for the automobile industry.

Appointments

To Represent Thos. W. Ward in Scotland

FROM last Friday Mr. STANLEY JESSOP has taken over the management of the Glasgow depot of Thos. W. Ward, Limited, engineers, coke, iron, steel, metal, and machinery merchants, etc., of Sheffield. He will also be in charge of the company's engineering interests in Scotland.

MR. S. JESSOP

Mr. Jessop, who has spent all his working life with Thos. W. Ward, joined as an apprentice in 1928 and spent some years in the machinery department before being appointed as a representative in the north Midlands in 1938. He held this position until 1945 and during the war years also served on the honorary advisory committee to the Machine Tool Control. In 1948 he went out to India to establish the group's interests in that country and, on his return in 1955, became sales manager of Fredk. Town & Sons, Limited, Halifax, and Woodhouse & Mitchell, Brighouse, the companies representing the principal machine-tool interests of the Thos W. Ward group.

Group appointments officer at Peterborough for the Baker Perkins, Limited, group of companies for the past three years, Mr. R. T. SHENTON, has been appointed sales personnel manager for W. & T. Avery, Limited, Birmingham.

Mr. JOHN M. BELLIS has been appointed land and minerals officer for the No. 5 Area of the North-Eastern Divisional Coal Board in succession to Mr. S. G. Lisle, who has retired after 50 years' service in the mining industry.

Mr. A. G. M. GREZO has been appointed sales manager of the Workington Iron & Steel Company, branch of the United Steel Companies, Limited. He will be responsible to the commercial manager, Mr. J. Laird, for the sales of all Workington products.

New manager of Whitwick Colliery (Leics) is Mr. T. C. MCCARTHY, who has taken over from Mr. William Hall. Mr. McCarthy entered the mining industry in 1938, and after the war went to Ellistown Colliery where he has been manager. He is a member of the South Midlands branch of the National Association of Colliery Managers.

A specialist in the application of electrical transformers to arc welding and X-ray technology, Mr. RAYMOND V. ELY has been appointed consultant to Gresham Transformers, Limited, Middx. His activities with the company will be concerned with the introduction of new Gresham products in the industrial, technical, medical, and research fields, in X-ray technology and arc welding.

Mr. JOHN E. L. SMITH, for the past four years manager of the Tar and Benzole Works Refinery at the Avenue Carbonization Plant at Wingerworth (Derbyshire), has been appointed head of the by-products department at the National Coal Board's London headquarters at Hobart House, and takes up his post in May. He was for 10 years plant manager at the North Thames Gas Board's products works.

Mr. GODFREY WALKER, who has been appointed public relations officer for the Steel Company of Wales, Limited, will be based at the London office: Margam House, St. James's Square. He will also have the duties of advising the chairman and the sales controller on matters affecting prestige and commercial advertising. Mr. WENDELL LEYSHON, assistant information officer, succeeds Mr. Walker at Port Talbot.

Mr. W. M. T. Branson, home sales manager since 1946 for Aveling-Barford, Limited, earthmoving equipment manufacturers, of Grantham (Lincs), is entering semi-retirement but will remain available in an advisory capacity. The new post of sales manager earthmoving (home) has been filled by Mr. J. R. PULFREY, formerly group sales manager for East Midlands and East Anglia. Mr. H. WYNNE, formerly home sales manager, has been appointed home sales office manager.

"Noel Webster" Junior Travelling Prize

ADDITIONAL annual prize, to be known as the "Noel Webster" Junior Travelling Prize, is to be awarded by the Midland Institute of Mining Engineers. It will commence this year, will be valued up to £100, and those eligible to compete are members of the junior section of the institute who are taking or have taken the Higher National Certificate course in mining or an equivalent technical college course. The prize is to enable the winner to spend two weeks abroad, substantially for visiting collieries, but also to include matters of general cultural interest.

The method of selection will be by an essay of set title each year or alternatively on a paper presented to the junior section on a mining subject; a progress report from the Head of the Technical College Department in which the candidate is a student or an immediate past student; and an interview. The set title essay for this year will be "Some Aspects of Coal-face Mechanization" and the essay should not exceed 3,000 words. Candidates should submit their essay to the honorary secretary of the Midland Institute not later than June 1, 1961.

The North-Eastern Divisional Coal Board, which warmly welcomes this decision, has agreed to make good any loss of wages or salary sustained as a result of taking up the award by any successful candidate who is employed by the board.

Law Cases

£1,200 DAMAGES AWARD RESTORED

DAMAGES of £1,200 awarded in July, 1959, to Miss Margaret Fleming (37), of Hamilton (Lanarkshire), and later set aside, have been restored by the Second Division of the Court of Session. Miss Fleming sued Honeywell Controls, Limited, control and switchgear engineers, etc., of Motherwell, for £2,000, alleging she contracted dermatitis through contact with oil coolants while working for the defendants.

Lord Thomson gave judgment that the company could not fulfil its duty properly by providing tepid or cold water for washing. It failed, therefore, to take the reasonable precaution which the situation called for. Lords Patrick, Mackintosh, and Strachan concurred.

Coal Must Fight

"CONTINUOUS EFFORT" NEEDED BY PRODUCERS IN EUROPE

STRENUOUS and continuous sales efforts will be required by European coal producing countries to meet the developing competition from other forms of energy, and to make the technical and economic advantage of coal for various groups of users more widely known, says a review of the coal situation in Europe, prepared by the Secretariat of the Economic Commission for Europe. Past investment in the coal industries, together with the closure of marginal mines and efforts to improve efficiency, had led, however, to significant improvements in productivity with consequential effects on costs and on the competitive position of the industries.

These improvements, says the report, are likely to continue and by 1965 the greater part of the industries' capacity will have been modernized. There are good reasons for believing, it states, that productivity may rise by approximately 3 per cent. per annum on the average between now and 1965, as compared with 1 per cent. per annum over most of the post-war period, when, under the impetus of unsatisfied demand, every effort was made to increase production as rapidly as possible, with little regard to competitive considerations.

The selling difficulties encountered by the coal industries had been aggravated by temporary and cyclical factors, but the situation would not have been so serious had it not been for the profound structural changes taking place in Europe's energy balance. The revival in west European economic expansion and the measures taken by the coal industries had led to an improvement in the situation and, in 1960, current production and demand came into balance.

Raising Productivity

With the fundamental change in the supply of other forms of energy, future coal production will depend only partly on the capacity of the industry, but primarily on demand factors, says the report. The coal industries had revised their long-term plans to take account of the structural shifts taking place. While in eastern Europe and the USSR planning was being extended to the demand side, this was not the case in western Europe where consumers were on the whole free to use the fuel of their choice. Some governments of coal-producing countries had found it necessary over the past two years to take measures to slow down the effects of the switch to other forms of energy, but these measures were for the most part temporary.

The importance of making every effort in participating countries to prevent a recurrence of the sharp falls in the demand for coal of the magnitude experienced between 1957 and 1959, if confidence is to be restored in the future of the coal industries, clearly emerges from the report. In the light of the modifications in the European energy situation and the need for assuring plentiful supplies of low-cost energy, this would imply taking measures enabling the industries to meet the competitive requirements of the future, so far as they can be foreseen.

The coal industries in the countries most affected by selling difficulties were being reorganized with the object of raising productivity to a level where costs were competitive with those of other energy suppliers. This was involving the closure of considerable amounts of marginal capacity, but when closing capacity it was important to guard against such a contraction that would prejudice the industry's possibilities of meeting the likely long-term demand.

Post-war experience had shown, says the report, that when factors of a structural nature were superimposed on temporary factors, the problems that arose for the coal industry "cannot be dealt with by adopting temporary expedients only, such as stockpiling, transfers of labour from production to investment work, etc." On the other hand, when the coal industries were operating within a healthy economic climate, short-term fluctuations could be overcome.

"When structural problems are encountered, as at present, State intervention may be necessary for social reasons and many governments take the view that, in such cases, it is essential to have the appropriate means to hand. In the present circumstances, increasing attention is being given to the problems arising from inequalities in competitive conditions between the various forms of energy, and of possibilities of achieving a certain harmonization."

The report says that assessment of the coal industry's prospects in Europe as a whole over the next decade shows that demand is confidently expected to increase in two major sectors: the coke ovens and the power stations. In 1959, these two sectors accounted for half of the total European consumption of hard coal. In other sectors such as the railways, canal and river navigation, and bunkers, there is already an established trend away from coal, while in the gas industry the demand for coal is being reduced through the application of new processes. In the general industrial and domestic markets, demand is very flexible in the long run and the share enjoyed by coal would depend basically on its relative economic advantages to that of other forms of energy.

The report concludes that for the future it is clear that, as a result of population increases, rising standards of living, and expansion of new housing, energy consumption in the domestic sector will increase, but against this must be put the economies that can be expected from improvements in heating equipment and heating insulation. In western Europe, oil was likely to take an increasingly large share of the market. The domestic sector was, therefore, a key sector, in which the coal industry in western Europe would have to compete with other forms of energy.

Board Changes

New Deputy Chairman of Dorman Long

NEW deputy chairman of DORMAN LONG & COMPANY, LIMITED, and managing director of Dorman Long (Steel), Limited, is Mr. Edward Thomas Judge. This follows Sir Ellis Hunter's relinquishment of all his executive posts with the group, while continuing as chairman of Dorman Long & Company and of its principal subsidiaries.

MR. E. T. JUDGE

Mr. Judge, who was appointed joint managing director of Dorman Long (Steel) last year, and an executive director of the parent company, is 52. He joined Dorman Long as a trainee in 1930 after leaving Cambridge University where he gained a mechanical sciences tripos with honours. Seven years later he became chief technical engineer and in 1944 was made a special director, being appointed a full member of the board in 1947.

He took a major part in the company's large post-war developments, and especially in the design and construction of the new steelworks and the universal beam mill at Lackenby.

GLOVER & MAIN, LIMITED—Mr. Lyle Pixton has joined the board.

HALL-THERMOTANK, LIMITED—Mr. J. C. Akester has been appointed a director.

W. E. NORTON (MACHINE TOOLS), LIMITED—Mr. C. C. Britten has joined the board.

STONE-PLATT INDUSTRIES, LIMITED—Mr. R. T. Pemberton has been appointed to the board.

JOHN BOLDING & SONS, LIMITED—Mr. John F. Bolding has been appointed a joint managing director.

A. T. POETON & SON, LIMITED—Mr. Francis A. McAweeny has been appointed a director and secretary.

MARKLAND-SCOWCROFT, LIMITED—Mr. G. H. Thackrah, sales manager, has been appointed to the board.

CHARLES CHURCHILL & COMPANY, LIMITED—Managing director of Roneo, Limited, Mr. Paul Chamberlain has been appointed to the board.

E. H. BENTALL & COMPANY, LIMITED—Mr. J. W. Woolley has resigned his directorship, but will continue his association with the company as technical consultant.

GATE MACHINERY COMPANY, LIMITED—Mr. E. A. Elmore has joined the board, and consequently has resigned his directorship of B. Elliott & Company, Limited, the parent company.

GENERAL ELECTRIC COMPANY, LIMITED—Mr. W. A. C. Maskell, general manager of the telecommunications group at Coventry since October, 1959, has been appointed managing director of the group.

MATTERSON, LIMITED—Mr. Q. C. M. Matterson, founder and joint managing director, has retired. He is succeeded by his son, Mr. R. Kelvin Matterson, who has been joint managing director since 1957.

ANGLO-SWISS SCREW COMPANY, LIMITED—Mr. Oscar Frey has relinquished his post as managing director, but continues as chairman with Mr. P. R. Brierley and Mr. F. A. H. Frey as joint managing directors.

LONDON TIN CORPORATION, LIMITED—Deputy chairman, Sir Douglas Waring, has been appointed chairman in succession to Mr. J. Ivan Spens, who has retired from the board. Sir Douglas is a director of many oversea tin companies.

ECCLES (BIRMINGHAM), LIMITED—Mr. W. J. Riley and Mr. H. A. Riley have retired from the board. Mr. K. H. Cubitt becomes general manager with Mr. Ian M. Whyte as secretary and Mr. N. Jones assistant secretary and accountant.

DUBELIER CONDENSER COMPANY (1925), LIMITED—Mr. F. H. McCrea has retired as managing director, but will continue as chairman and senior executive director. Mr. J. Goodman and Mr. J. H. Cotton have been appointed joint managing directors.

METAL CLEANING, LIMITED—Mr. E. B. Bishop has been appointed secretary in succession to Mr. G. J. B. Williams who is to concentrate on the reorganization and sales development. Both are directors of the company, which is a member of the Castrol, Limited, group.

STAVELEY IRON & CHEMICAL COMPANY, LIMITED—Mr. E. M. Marvill, director and general manager of the subsidiary, the Sheepbridge Company, Limited, Mr. G. R. Buckley and Mr. E. M. Summers, directors of the Stanton Ironworks Company, Limited, and Mr. R. F. A. Turner, have been elected directors. Mr. Turner has also been appointed general manager of Staveley works. The appointments have been made following the resignation of Mr. S. N. Turner and the retirement of Mr. C. H. M. Owen.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED—Mr. St. John de H. Elstub has been appointed chairman of the metals division in succession to Mr. M. J. S. Clapham who has joined the company's main board as an oversea director. Dr. William H. G. Lake has been appointed joint managing director (technical) of the division in succession to Mr. Elstub. Mr. Derrick H. Carter succeeds as chairman of the general chemicals division, Mr. Harold Smith, who was recently appointed to the main board. Mr. Carter is succeeded as joint managing director (commercial) of the division by Mr. John L. Tedbury, a director.

Heavy Drop in Enfield Rolling Mills Group Profits

MONEY was lost on stocks of metal as foreshadowed, selling prices were held down in the face of cost increases, and the direct extra costs due to the dock strike were over £40,000, state the directors of Enfield Rolling Mills, Limited, in announcing a drop in group profits, before tax, from £1,685,432 to £1,192,780. The dividend is maintained at 15 per cent. with an unchanged final of 12½ per cent.

The statement points out that it is just over two and a half years since the directors were faced with the loss, overnight, of that basic tonnage around which the whole company had been built. The decision to extend the range into the cable field "was right" but the full benefits of such radical changes take long to materialize; and it will be at least another two years before the financial effects become fully apparent of all that has been done and of further moves under consideration.

FIFTEEN MINERS with a total of 800 years' service in the industry were presented with cheques from the National Social and Welfare Club at a concert at Wattstown (Glam) Miners' Institute last weekend.

IRON AND STEEL TRADE

ALL the signs indicate that order-books for the current quarter will soon be filled, particularly for the heavy rolled products required by the engineering industries and contractors. There has been an acceleration in the booking of new work by manufacturers of industrial plant over a fairly wide range, for ancillary equipment and also for machine tools. It is noticeable that many recent substantial contracts have been for oversea customers, and smaller engineering concerns are also having some success in this field.

Pig-iron

Current production of the foundry grades of pig-iron is maintained at a level which ensures plenty both for consumption and stock requirements. However, few foundries are carrying stocks of any size and the ease with which they can get supplies does not encourage forward buying.

The call for low phosphorus pig-iron remains at a substantial level, while good quantities of hematite are being taken up. The demand is steady, but not so great for the refined irons and high-phosphorus irons and the steelworks can obtain all the basic pig-iron they need.

Semi-finished Steel

The re-rollers are fairly well provided with work and are able to maintain reasonably good outputs of small bars and light sections. The call for reinforcing rods and bars is still considerable. However, headway is being made with arrears of orders and delivery dates have shown welcome improvement.

The mills are amply provided with mild steel semis and all arisings at the steelworks of suitable re-rolling quality defectives and crops are taken up.

Finished Steel

Normal production is now in full swing again after the holiday but there has been no noticeable surge in the amount of business being placed. Output from new plant is not yet able to cope with the orders for plate, and delivery dates are still extended. The opposite is the case for cold reduced sheets, nor has the position improved so far as cold reduced strip, flat and corrugated galvanized sheets, and good commercial quality bright drawn bars are concerned.

The makers would welcome easier conditions for the supply of special quality steels for alloy bright bars, greater tonnages of which could readily be disposed of. Orders for colliery arches, pitprops, and light rails are still restricted.

Hoogovens Cuts Steel Prices to Common Market

DUTCH concern, Koninklijke Nederlandse Hoogovens-Steelworks, of Ijmuiden, has reduced its list prices for a number of different steels. The reductions, which will affect Common Market countries only, vary from 1¼ to 8 per cent.

The price of ship's plate is reduced by Fls. 17.50 per ton—a reduction of 4 per cent. Ordinary plate will now be Fls. 7.50 per ton cheaper—1¾ per cent. less. For tinplate, a price reduction of Fls. 65 to Fls. 73 is announced, a cut of 7 to 8 per cent. Price reductions for sheet steel and pig-iron are being considered by the company.

Iron-ore Imports

IMPORTS of iron ore and concentrates (except chrome iron ore) and roasted iron pyrites in February, and the totals for the first two months of this year and last, are shown in the table below.

From	Month ended Feb. 28.	Two months ended February 28.	
	1961.	1960.	1961.
	Tons	Tons.	Tons.
Sierra Leone	41,437	143,210	93,592
Canada	59,220	223,405	145,130
Other Commonwealth countries and Eire	—	5,225	2,500
Sweden	371,130	740,061	835,041
Norway	26,507	58,305	40,287
France	46,705	93,143	88,654
Portugal	38,003	64,658	53,458
Spain	78,738	129,612	131,744
Algeria	108,598	324,833	284,720
Tunisia	32,900	121,247	56,920
Morocco (excluding Tangier) ..	17,230	138,242	89,715
Liberia	14,880	75,220	51,692
Venezuela	161,896	302,221	414,163
Brazil	59,595	109,533	154,382
Other foreign countries	55,804	117,581	100,271
TOTAL	1,112,643	2,646,496	2,542,269

Third Oxygen Plant to Feed Scunthorpe Steel Firms

THIRD tonnage oxygen plant for the steel industry at Scunthorpe is to be built by British Oxygen Company, Limited. It will supply 200 tons of oxygen a day, and when in service by the end of next year will raise British Oxygen's capacity at the Warren Lane works to 600 tons a day. The installation will cost about £750,000.

Already in operation at Warren Lane is one 200-ton plant, and a second is to start later this year. All three plants will pipe oxygen to the Appleby-Frodingham Company, branch of the United Steel Companies, Limited, to feed the Ajax steelmaking furnaces, to the Redbourne works of Richard Thomas & Baldwins, Limited, and to John Lysaght's Scunthorpe Works, Limited.

There are now eight tonnage oxygen plants supplying the steel industry in the UK.

THE PRESENTATION OF AWARDS to 15 employees with 25 years' service and five 40-year members took place at the annual dinner recently of the 25 Year Club of the Harland Engineering Company, Limited, Alloa.

Distinguished Sheffield Metallurgist Retires

DR. EDWIN GREGORY, whose retirement as chief metallurgist of Edgar Allen & Company, Limited, was announced in last week's IRON AND COAL, can claim to be "Sheffield Made." He was educated at the old Sheffield Central School and the city's university and the greater part of his career has been spent in Sheffield.

DR. E. GREGORY

After about 12 years with Kayser Ellison & Company, Limited, he left on account of ill-health in 1920. The following year he joined the permanent staff of the metallurgical department of Sheffield University. At the end of 1937, wishing to return to production work, Dr. Gregory left the university to become chief metallurgist at the Park Gate Iron & Steel Company, Limited. In 1943, he was appointed head of the metallic materials section of AID with the rank of assistant director. He joined Edgar Allen in 1944 and was appointed a director in 1946.

His many contributions to technical literature include his first text-book, Metallurgy, published in 1931 and still a standard work in universities and technical colleges in the UK, the Commonwealth, and the US, and a number of works written in collaboration with Mr. W. W. Stevenson and with Mr. E. N. Simons. He has acted as associate editor of Kempe's Engineers Year Book since 1937 and during his career has made many contributions to the discussions of and presented papers before the Iron and Steel Institute.

Dr. Gregory is or has been a member of the Council of the Royal Institute of Chemistry, founder-Fellow and a vice-president of the Institute of Metallurgists, member of the Heterogeneity of Steel Ingots Committee, Alloy Steels Research Committee, a governor of the National Foundry College, and past president of the Institution of Engineering Inspection. He is one of the original members of BISRA Council and is chairman of its Standard Methods of Analysis Committee.

He has a special interest in the British Steel Castings Research Association and took an important part in its formation, is a member of the council and finance committee and chairman of its research committee. In Sheffield his interests are equally numerous, particularly in connection with the university and further education.

ACCORDING TO FIGURES published by the Board of Trade, new orders received by the engineering industries for the home market increased in January, but there was a slight fall in net orders for export. The increase in orders, accompanied by a seasonal decline in deliveries, led to a modest increase in the volume of orders on hand. During 1960 production in the mechanical engineering sector increased more than in electrical engineering, a change from the experience of recent years.

Wales Should Not Depend only on Steel and Coal

WHEN he was installed as president of the Industrial Association of Wales and Monmouthshire recently, Dr. A. G. Ramsay, resident director of the International Nickel Company (Mon), Limited, gave a warning that Wales could return to "embarrassing over-dependence" on one or two industries because of the vast expansion of steelworks and new coal projects. He pointed out that the coal and steel industries were able to offer attractive wages and that the £120,000,000 Spencer steelworks was being erected in an area which had no surplus workers. This "embarrassment" to other industries was one of the dangers which Wales must avoid, he told the association's annual meeting at Cardiff.

Dr. Ramsay also made reference to the acute shortage of craftsmen. Although trade unions had eased the ration of apprentices to skilled workers, there were still too few apprentices, particularly in engineering, he said. "The position is serious and requires urgent action," he said. "Wales will suffer, as it has in the past, if it is short of craft labour." He advocated a reduction in the traditional five-year training period, and then the removal of age limitations.

He went on to say that if Wales could avoid these two dangers, it had a bright future. He praised the Board of Trade for introducing a "phenomenal" number of new industries to Wales, but questioned whether Britain could any longer afford to move people to remote industries requiring new houses and even new towns and causing the dereliction of existing areas.

Dr. Ramsay is a member and former chairman of the West Wales District Committee of the Welsh Board for Industry and represents the Industrial Association on the governing body of the Welsh College of Advanced Technology.

CEA OFFICERS APPOINTED

COUNCIL of the Combustion Engineering Association has appointed the following to hold office for the year 1961-62:—President: Mr. N. A. McNeill, Unilever, Limited; vice-presidents: Mr. S. P. Chambers, chairman, Imperial Chemical Industries, Limited; Sir John Charrington, chairman, Charrington, Gardner Locket & Company, Limited; Mr. G. D. Elliot, John Thompson (Australia) Pty, Limited; Brig. K. Hargreaves, managing director, Hargreaves (Leeds), Limited; Mr. H. C. Hawkins, the British Xylonite Company, Limited; Sir Edward Thompson, chairman and managing director, John Thompson, Limited; Mr. B. E. A. Vigers, deputy chairman, Laporte Industries, Limited; Mr. F. Wilkinson, marketing member of the National Coal Board; Chairman of the Council: Mr. M. S. Gaskill, West's Gas Improvement Company, Limited; honorary treasurer: Mr. E. W. Barnes, managing director, Riley (IC) Products, Limited.

Brig. Hargreaves and Mr. Wilkinson are newly appointed.

TWELVE MINERS due to be transferred from Aldwarke Colliery, Rotherham, to other pits last week are to stay at Aldwarke for another month. The transfer was arranged as part of the running down of the 96-year-old pit, due to close later this year, but since the plan was made the labour force has dwindled from 600 to 515, due to men leaving for other industries.

The "Weybridge" MULTIPLE MOULD PROCESS for CONTINUOUS CASTING OF TONNAGE STEEL

by J. SAVAGE, B.Sc., F.Inst.P. and J. PEARSON, Ph.D., F.R.I.C.

(Technical director, Continuous Casting Company, Limited)

(Assistant director, BISRA)

After discussing the desirability of increasing production rates of continuous casting plants the authors describe successful trials of a multiple mould method designated the "Weybridge" process. This not only substantially increases the production rate of a continuous casting unit, but also improves operational reliability and lessens the capital and operating costs.

HITHERTO, the casting rates of so-called billet and bloom sections produced by continuous casting have been relatively low, ranging from 5 to 25 ton/hr./strand for sections 2 in. to 10 in. square. It has therefore been generally believed that continuous casting would be more readily applicable to the production of slabs, where casting rates of the order of 60 ton/hr./strand are already attainable.

Raising casting rates for square sections by increasing withdrawal speeds results in deterioration of the quality and in a risk of failure of the casting process, due to tearing or bulging of the very weak ingot shell. On medium and large bloom sections, high withdrawal speeds also require a considerable height to be allowed for solidification of the ingot, so that such machines may be very high indeed, requiring either a very tall building or a deep excavation.

In order to cast in the usual shape of mould, furnace charges of 40 tons and upwards, such as are now common with oxygen steelmaking processes, complex multi-strand plants are required, probably with a minimum of four strands. One such production plant already has eight strands[1], while a number of four-strand machines are now either in operation, under construction or projected in Russia, Europe, and the UK.

Low casting rates require the use of small tundish nozzles, which present considerable operational difficulties when they have to be kept open over long periods. The tundish refractory linings therefore require high pre-heat temperatures, with consequent severe wear on the refractories and high fuel consumption.

The "Weybridge" Process

In order to increase the casting rates for a single-strand producing square sections to those which are obtainable with slabs, the Continuous Casting Company, and the British Iron and Steel Research Association, have now successfully pioneered the development of an entirely new method based on a patented multiple mould[2].

This "Weybridge" process not only substantially increases the casting rate for any square section, but at the same time greatly simplifies tundish and nozzle operation, so inherently improving the reliability of continuous casting plant opera-

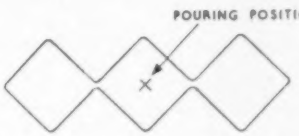

FIG. 1.—SCHEMATIC PLAN VIEW OF CONTINUOUS CASTING MULTIPLE MOULD.

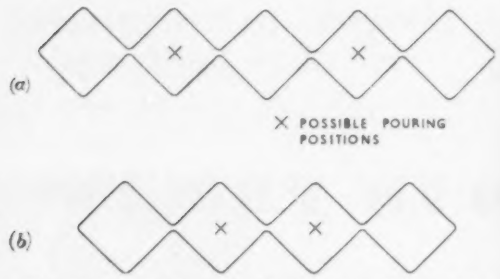

FIG. 2.—TWO POSSIBLE ALTERNATIVE MULTIPLE MOULDS.

tion, a feature which is of paramount importance.

Fig. 1 shows a simple plan view of the multiple mould now in use, producing at present 3-in. sq. sections. Liquid steel is poured from a single tundish nozzle into the central mould section, the metal being distributed into the outer moulds from the centre through the short and narrow channels. Many variations of this basic system are, of course, conceivable, and two possibilities are indicated at (*a*) and (*b*) in Fig. 2.

The "in-line" arrangements shown in Figs. 1 and 2 lend themselves readily to simple designs of guide roller and withdrawal roll units, to the bending of the cross-section if required below the withdrawal rolls, to the design of disposal baskets for vertical cut-off machines, and to the subsequent parting operation of the sections before rolling.

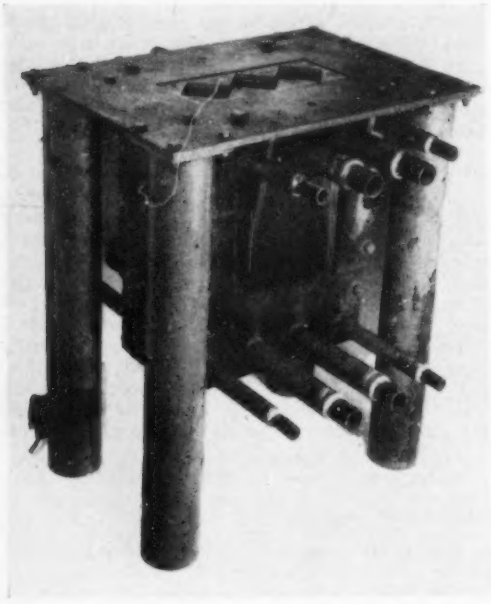

FIG. 3.—CONTINUOUS CASTING MULTIPLE MOULD.

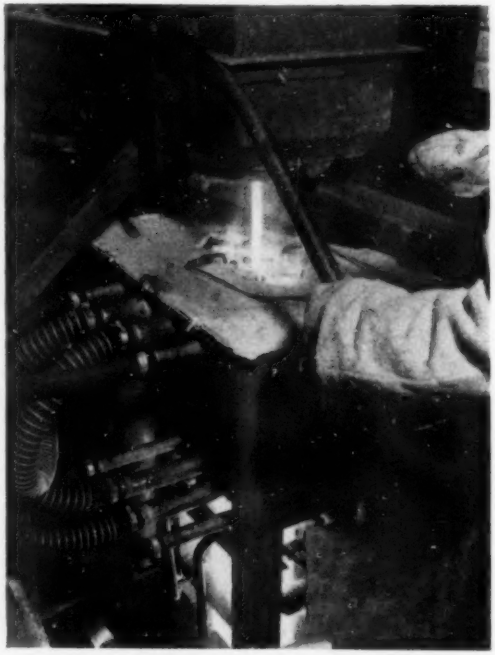

FIG. 4.—POURING STEEL FROM TUNDISH DURING CONTINUOUS CASTING BY THE MULTIPLE MOULD PROCESS.

Preliminary Tests

Before continuous casting operations were undertaken, static casts were made into a steel mould comprising three 3-in. square sections, as shown in plan view in Fig. 1. The stripping of the ingots was carried out after a relatively short time of solidification, roughly equivalent to that applying in the case of a continuous casting mould.

These preliminary tests were made in order to confirm calculations on the correct feeding of the liquid steel through the short and narrow channels which connect the outer moulds with the centre section. It was also necessary to establish that the structure of the steel in the area near the webs was suitable for subsequent parting and rolling, since it is, of course, of the greatest importance that cutting should be made only through the so-called "chill" zone. It was also established that with very early stripping of such a static ingot, the contraction of the multiple ingot in the mould did not produce any internal or surface cracking of the steel in the region of the webs.

Continuous Casting Operation

The preliminary tests were so encouraging that the Continuous Casting Company then designed and constructed a triple 3-in. square mould for proving the continuous casting process. Many

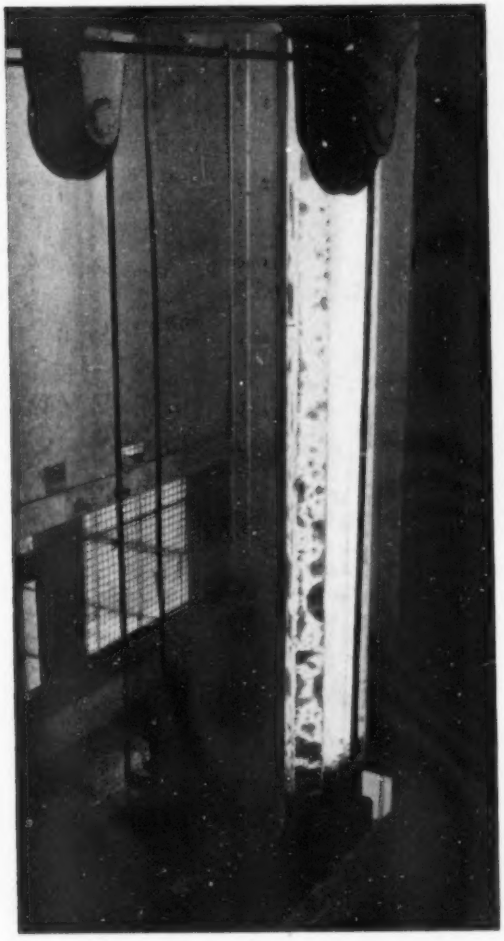

FIG. 5.—CONTINUOUS CASTING OF MULTIPLE SECTION IN PROGRESS.

runs were made on the experimental casting machine in the BISRA Sheffield laboratory. These operations with the electric steel selected, En 5, proceeded very smoothly indeed from the outset and confirmed the feasibility of this revolutionary method of solving the inherent problem of obtaining high casting rates for so-called billet and bloom sections. A photograph of the mould is shown in Fig. 3.

The mould walls are made from copper and are, of course, surrounded by a water-cooling jacket.

Figs. 4 and 5 show the casting process in operation and Fig. 6 shows some of the continuously cast steel sections before parting. The excellent surface quality should be noted.

The quality of the as-cast material fully confirmed the promising results which had already been obtained on statically cast multiple ingots of the same section. The continuously cast material shows no evidence whatever of either internal or surface cracking.

Fig. 7 shows a ground cross-section, and it will be noted that there is no distortion such as is frequently seen on sections cast in a single mould.

Figs. 8 and 9 show etched sections and sulphur print, respectively, which reveal the excellent as-cast structure of the steel.

Basic Features of a Production Plant

The methods of parting the sections after cutting to length and disposal from the plant are, of course, quite orthodox. Separation may be achieved by a simple rolling pass such as is common in a number of commercial applications in the steel industry, by a suitably designed saw or shear or by flame cutting. Although methods for parting the sections in the vertical while the multiple ingot is still in the casting machine are feasible, it is considered that this would not offer any great advantage compared with parting after the disposal operation.

There is, of course, no reason why the cast sections should not be bent below the withdrawal rolls where this offers advantages, as is already done on single square sections. The required radius of curvature need be no greater than is required for a single section of the same size.

The withdrawal rolls on a commercial machine would comprise diabolo rolls supporting the three pairs of opposite corners of a triple section, the outer pair of rolls being movable if necessary along the drive shaft, in order to permit the casting of different sizes of section without the necessity to change the withdrawal rolls.

Advantages of the "Weybridge" Process

The advantages of this advanced method of continuous casting can be summarized very briefly as follow:—

(1) *Reduction in Number of Casting Strands.*—The casting rate per strand can be trebled by the use of a mould such as is shown in Fig. 1. This means that casting rates of 50 to 60 ton/hr./strand are now possible for 8-in. to 10-in. blooms. A twin-strand plant based on the "Weybridge" process would permit a higher rate of production than a four-strand machine of the type used hitherto.

(2) *Savings in Cost.*—The economic advantages of this process will be immediately apparent. For a given size of furnace the number of strands installed to cast a heat within a given time may now be considerably reduced, with a substantial reduction in the investment cost.

The number of men required to operate a casting machine is related almost directly to the number of pouring positions, cut-off stations, and disposal equipment which have to be controlled. Some of the very considerable saving which is obtained by the use of fewer strands will be partially offset by the need to part the cast sections. However, studies of particular cases which have been made

by the Continuous Casting Company have demonstrated that a most impressive reduction of overall capital and operating costs will be obtained compared with orthodox multi-strand continuous casting plant operation.

(3) *Operational Reliability.*—The far higher pouring rates which are now possible will bring several most important operational advantages. It is, of course, well known that the problem of maintaining the regularity and reliability of the flow of liquid steel decreases as the pouring rate is increased. A high percentage of stoppages of continuous casting machines have been attributed to the blocking of the tundish nozzle or to instability of the liquid stream when casting at the rates attainable hitherto.

The "Weybridge" process will minimize this very serious source of trouble and loss of yield resulting from failed casts.

FIG. 6.—CONTINUOUSLY CAST MULTIPLE SECTIONS BEFORE PARTING.

FIG. 7.—GROUND TRANSVERSE SECTION OF MULTIPLE INGOT.

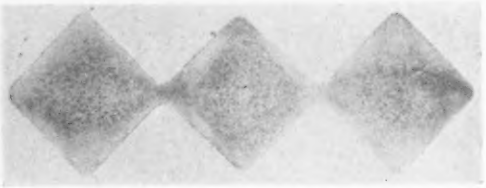

FIG. 9.—SULPHUR PRINT OF TRANSVERSE SECTION TAKEN NEAR TOP OF INGOT.

When using low casting rates, very intense preheating of the tundish lining and nozzle has been necessary. Consequently, the life of the tundish refractories has been relatively low and fuel consumption rather high. A reduction of cost per ton of steel for these items will now be achieved.

Parting and rolling tests are in progress and detailed metallurgical examination is being made. A fuller report will be issued shortly.

The "Weybridge" process is now in operation using a reciprocating mould cycle for casting low carbon steel on the large-scale pilot machine of the Centre National de Recherches Métallurgiques at Charleroi in Belgium. A mould is also under construction for the production of 5-in. blooms, and from the experience to date it is expected that a production rate of at least 35 ton/hr. on one strand making 5-in. blooms will be obtainable.

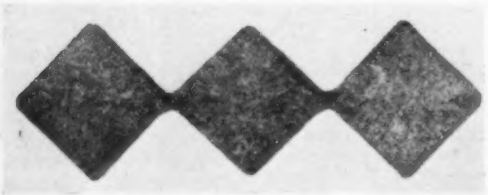

FIG. 8.—ETCHED MULTIPLE SECTIONS SHOWING THE AS-CAST STRUCTURE.

The possible range of application of the process to the production of high alloy and special steels is also to be investigated by the Low Moor Alloy Steelworks in collaboration with the Continuous Casting Company.

The authors gratefully acknowledge the invaluable assistance in the development of the process given by Mr. W. H. Pritchard and Mr. E. Ball of the Continuous Casting Company, and Mr. G. Littlewood and other members of the continuous casting team of BISRA Steelmaking Division.

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Cementation and Silicatization

OF THE SHAFTS AT

BETTESHANGER COLLIERY

by H. Fairclough

Methods of minimizing the leakage of water in the upcast and downcast shafts at Betteshanger Colliery are described in this paper, which the author read at a meeting of the Kent Branch of the National Association of Colliery Managers on January 29, 1960. The method adopted involved the cementation and silicatization of the shafts by injection from an inset and from the top of the cages. The operation, undertaken during 1959, was more successful than had been thought possible. The make of water was reduced by 140 gal./min., working conditions have been improved, the team strength of the shaftsmen has been reduced, and better maintenance of the shaft equipment has resulted.

THIS paper has been prepared to serve dual purposes, both of which are equally important. (*a*) To place on record an exact account of the work carried out during the period concerned and the results obtained, and (*b*) to serve as a guide for future work of this kind which may be undertaken, so that others may benefit from the experiences at Betteshanger Colliery.

When attempting to obtain the historical information recorded during the sinking of the shafts at Betteshanger, and in subsequent operations carried out in the shafts, the importance of a correct record became immediately apparent. In preparing for the recent shaft repairs such knowledge was not available for use, and of the information to hand much was unreliable. Should further repairs be undertaken in the shafts, all the necessary information will have been recorded and will consequently save much valuable time and effort.

Brief History of Betteshanger Shafts

A good deal of research into old records and correspondence kept at the colliery at the time has been carried out and, from details from persons engaged in the sinkings, including the present unit engineer at Betteshanger, and Mr. Howard, the divisional mechanical engineer, it has been possible to establish the true sequence of events. From the details on record it is obvious that water was a major problem throughout and progress was made possible by experience gained in previous sinkings in Kent. The sinkings began in 1924 and were completed in 1927.

The shafts are both 22 ft. finished dia., the downcast being 2,252 ft. and the upcast 2,424 ft. deep. Both shafts have concrete linings of differing thicknesses except in the Hastings and Folkestone sand-bed regions, where German-type tubbing was placed to form a seal between the strong Gault and the top of the Coal Measures. As can be seen in the shaft sections (Fig. 1), both shafts have many similar features.

There are concrete linings of differing thicknesses (12 in. to 36 in), except for 180 ft. of German tubbing in the sand-bed regions, and 27 ft. of 14-in. brick lining at the 1,900-ft. inset in the upcast shaft. The position of reinforcement and backsheeting in the sectors above the tubbing can be seen by reference to the shaft sections.

The tubbed section is composed of 72 complete rings, 2 ft. 6 in. deep (Fig. 2). A peculiarity of this tubbing in both shafts is the fact that the machined faces were laid together with no provision for caulking other than lead washers on the bolts and a small dovetail caulking slot on the shaft side of the rings. It is worthy of note that, during the sinking, mining engineers wanted provision made for lead sheeting laid between the tubbing flanges, but the owners, Pearson & Dorman Long, Limited, a firm of civil engineers, had the last word and decided to use machine-faced tubbing which had been employed successfully by civil engineers in the construction of the London Transport tube railway shafts.

There are connections between the shafts at the 727-ft., 1,900-ft., and 1,575-ft. inset levels. Ferrocrete was introduced after 100 ft. of sinking and was used extensively throughout the remainder of the walling with obvious advantages at the time over ordinary Portland cement.

Generally speaking, the shaftwork down to the base of the tubbing was fairly well recorded and work done was of a high standard. From previous sinkings in the locality and the Betteshanger Colliery borehole, experience was to hand of the extensive water difficulties to be met with in the chalk and the sand beds and heavy feeders of water at pressures up to 100 lb./sq. in. were struck from

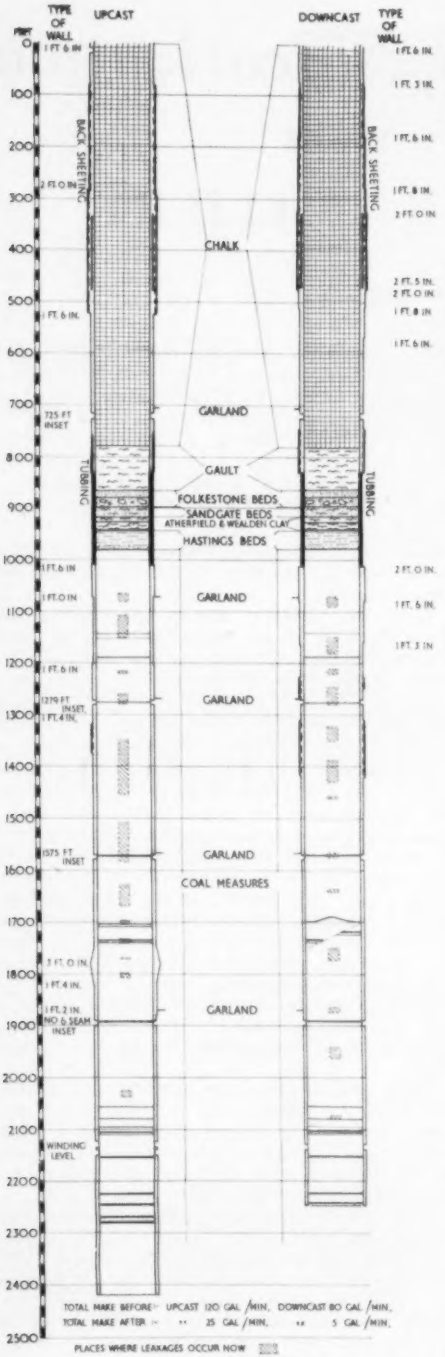


FIG. 1.—GENERALIZED SHAFT SECTION.

within 100 ft. of the surface down to the Gault in both shafts. All regions of the shafts above the tubbing received heavy cement injections to control the water.

The difficulties in the greensands were anticipated and for that reason the 727-ft. inset was constructed. Three 1,000-gal./min., 5-stage turbine pumps were installed and a borehole put down between the shafts to tap the water and relieve the pressure while sinking through the greensand was undertaken in the downcast shaft. The borehole struck the greensands and a pressure in the region of 300 lb./sq. in. was recorded, a considerable amount of greensand and water being ejected through the borehole.

Difficulties were experienced in clearing the large amounts of greensand and water released. The borehole was open from three to four weeks and in that time over 18,000,000 gal. of water and 344 cu. yd. of greensand were ejected. At the end of this period the make was steady at about 250 gal./min. at a pressure of 4 lb./sq. in. and the amount of sand was negligible.

The depth of the hole at 129 ft. meant the static pressure in the greensand was down to 60 lb./sq. in. Sinking continued and the 10th ring was laid in the downcast shaft. The shaft bottom was now 9 ft. from the greensands. Pumps were slung in the shafts to pump water out of the pit into the 727-ft. inset and from there to the surface. It was intended to bore a hole from the sump into the greensands and relieve the pressure, but weight of evidence suggests that feeders of greensand water estimated at 700 gal./min. broke through before the boring was done, and sinking carried on normally through the sands until the tubbing was well grouted in the Atherfield clay. The major factor of importance from this detail is that by assembling the tubbing under these conditions, sand and foreign matter got between machined flanges and the matching segments in each ring had to be machined to fit. A considerable amount of injection with ferrocrete and small quantities of silicate of soda was done while sinking proceeded and the leakages were stopped with the low pressure that existed.

The upcast shaft was sunk through the greensands to the Atherfield clay while pressure was released through the tubbing in the downcast shaft. A borehole was then put down 56 ft. in the upcast shaft from the 918-ft. level and tapped the Hastings beds; this hole yielded 60 to 80 gal./min. of water at a pressure of 73 lb./sq. in. This water was pumped to the 727-ft. inset while sinking again proceeded into the Coal Measures in the downcast shaft. The upcast shaft was sunk through the Hastings beds in similar fashion to the sinking through the greensands, *i.e.*, by "bleeding off" in the downcast shaft.

When the sinkings and injections through the tubbed sections were completed the shafts seemed dry, but leakages soon occurred as pressure built up and have continued over the years.

In the remainder of the shaft walls below the

tubbings, leakages occurred in the Coal Measures with regularity, but quantities were not very great, the highest make recorded being 50 gal./min. with low pressures. Injections were carried out at the time in these regions, but—apparently due to the small amounts of water—were not given the same attention as in the upper concrete linings. In fact, the quality of the shaft work has been proved during recent repairs to be inferior in the Coal Measures to that in the upper regions of the shaft, several patchy concrete lengths, bad grout rings, and thinness of the walling having been discovered.

The only other major shaft repairs known to have been carried out since sinking was completed were in 1953 when contractors were engaged for about a year to seal leakage; but only caulking was done in the tubbing sections, without any lasting benefits.

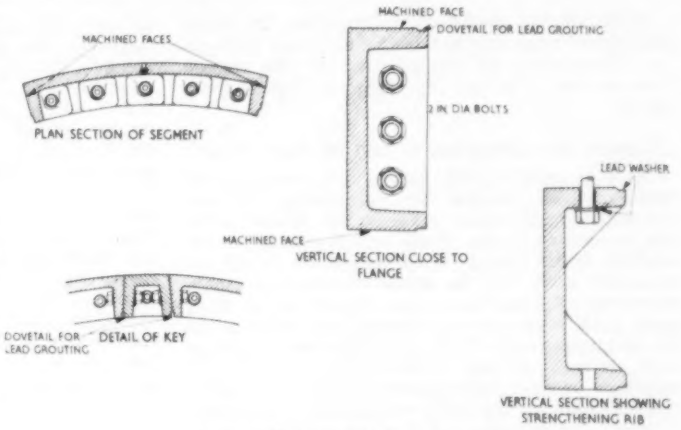


FIG. 2.—DETAILS OF TUBBING

Conditions in Shafts During Preliminary Investigations

Discussions with divisional engineers and senior management were held early in 1958 following inspection of both shafts. Shaft water surveys had been made previously to serve as a guide. The surveys indicated numerous leakage points and showed that the main leakages were from the tubbing sections in both shafts. Inspection revealed that within 300 ft. of the surface, water was falling throughout the entire area in both shafts, but a larger percentage was running down the concrete walling. The amount of water increased perceptibly with greater depth; at the tubbing section it was quite severe. This was equally apparent in both shafts.

The conclusion was reached that the water from the tubbing was the major source of trouble, especially in the Folkestone and Hastings beds. These regions lay between the 15th and 29th rings and the 59th and 61st rings, respectively, in each shaft, and it was thought to be obvious that, if this water could be successfully sealed off, the majority of the troubles would cease. This conclusion, however, was found during the sealing operations to be incorrect, but conditions in the shafts were too difficult at the time for it to be realised that a considerable number of leakages existed in the Coal Measures.

Arrangements were made for contractors, the Foraky Boring & Shaft Sinking Company, Limited, to carry out inspection of the shafts and tests in the tubbings and to ascertain their views on the possibilities of sealing the selected sections of the tubbing and the pressures likely to be met with in the sand beds. It was necessary to discover if there was any hydrostatic connection between the shafts in the sand beds and between the sand beds and the Coal Measures below.

The tests were carried out in June, 1958, and the results were as follow:—Holes bored in the 19th ring in the upcast and the 20th ring in the downcast shafts located the Folkestone beds' (greensands) water at 215 lb./sq. in. and 185 lb./sq. in., respectively. Three holes bored in the 58th ring in the downcast shaft failed to locate any water in the Hastings beds. Two holes bored in each of the 58th, 59th, and 60th rings in the upcast shaft failed to locate any water in the Hastings beds. A trickle of water was eventually located at 2 to 4 lb./sq. in. when a plug was removed in the 59th ring in the west wall of the shaft.

It became obvious that the Hastings water, which during sinking was present in fair quantities at a pressure of 100 lb./sq. in. must have found its way into the Coal Measures, which are in direct contact with the Hastings beds, as a result of mining operations since the shafts were sunk.

Hydrostatic Tests

It was considered that the great difference in pressure between the Hastings and Folkestone levels proved there was no hydrostatic connection between the sands. To discover if there was any hydrostatic connection between the shafts at the Hastings level and with the Coal Measures below, a fluorescence test was carried out. Fluoroscene was syphoned behind the 58th ring in the upcast shaft; over a period of 48 hr. samples were taken at leakages in the 58th ring in the downcast shaft and at leakage points below the tubbing in both shafts. The results of the samples proved to be negative, indicating no connection. However, while boring holes through the tubbing sections, proof was obtained that the tubbing had not lost its original thickness through corrosion. This was an important factor to be considered for subsequent silicatization and cementation against the known pressures existing in the greensands.

With all the necessary information to hand, contractors were engaged to seal all water leakages by cementation or silicatization in the region between the 15th and 29th tubbing rings in both shafts.

Reasons for Attempting to Seal off Shaft Water

It is as well at this juncture to mention the factors which decided the management to seal the Betteshanger shafts leakages. (*a*) Bettter working conditions in the shafts and the underground decking levels would be an immediate result; (*b*) eventual reduction in shaft maintenance team strength; (*c*) preservation and longer life of shaft gear, guide ropes, etc.; (*d*) reduced amount of water to be pumped out of the pit bottom from sumps and garlands; (*e*) the reduction of the wet bulb readings on the hydrometer; (*f*) the consequent reduced load on the main ventilating fan handling " drier " air; (*g*) reduction in water payments made on the classes of work indicated in (*a*); further deterioration in the leakages could lead to unsafe shaft walling and possible collapse of sections, especially in the tubbing, where the extent of corrosion was unknown and high pressures obtained.

Preparation for Shaft Repairs

Before the contractors arrived on site several detailed arrangements had to be made to dovetail the work in the shafts into the day-to-day operations of the colliery. A certain amount of site preparation had to be completed and additional services had to be scheduled to meet the contractor's needs. The 727-ft. inset had been inspected and proved ideal for their purpose. The necessary repairs were completed, compressed air, water, and telephone services were laid on and the inset made ready for housing the cementation pumps, tanks, chemicals, and other materials. The use of the inset meant the shafts and cages would be completely free and the extremely slow and costly work of loading the cages with the necessary materials and equipment every shift for mid-shaft injections was eliminated.

Additional pumps were installed in the sumps to deal with extra water that may have to be run off in the injection areas to reduce the pressures behind the tubbing. The " safe " maximum pressure of injection was not permitted to exceed 300 lb./sq. in. in the tubbing, this figure being fixed by the known original pressure strength of the tubbing when it was installed. With the high pressures existing in the Folkestone beds, it was thought that breakdown in local pressure would have to be achieved by running off water during injection periods to permit the pumping of cement and chemicals behind the tubbing in the required quantities. The estimated make of additional water in these conditions was expected to be in the region of 100 gal./min. Hosing-down arrangements were made at the decking levels to clean equipment and cages from any injection refuse and greensand accumulations.

Maintenance periods in the particular shaft under repair had been agreed and were from 10.30 p.m. to 4.30 a.m. Monday to Friday and all available weekend time, which in normal circumstances was expected to be two 12-hr. shifts, dependent upon the availability of the shaft. It was expected that at weekends arrangements would be made to cover winding-engine repairs, rope capping, and other necessary maintenance.

Detailed arrangements of material and dirt winding times were put into operation, the necessary period of maintenance and statutory inspection times being allocated to cater for the contractor's and colliery requirements. Attention to detail cannot be over emphasized in these circumstances, however simple it may seem, otherwise difficulties soon occur which lose shaft time or cause unnecessary pit delays.

Among the necessary detailed arrangements were:— (1) Contractor's materials handling arrangements—surface to 727-ft. inset; (2) NCB shaftsmen working with the contractors; (3) scheduling of colliery material and dirt-winding times; (4) NCB supervision—deputy manager, supervising engineer, overman in charge of shafts; (5) good spirit of co-operation from the word " go." Lastly the local branch of the NUM was kept in the picture and arrangements were made for the

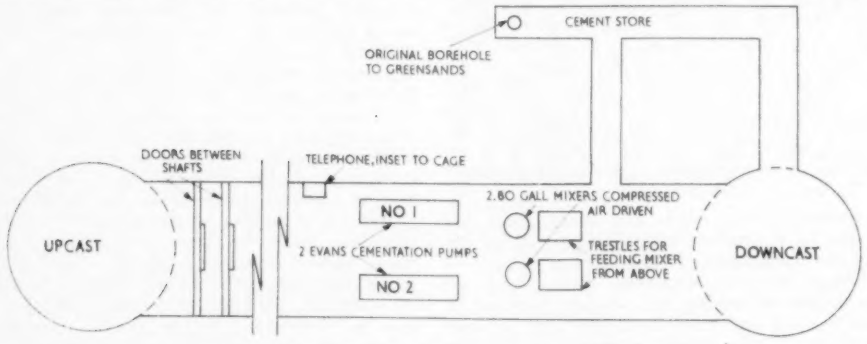


FIG. 3.—ARRANGEMENT OF EQUIPMENT AT 727-FT. INSET.

contractor's men to become union members. This last step, it will be appreciated in the Kent coalfield, was not the least significant.

Cementation and Silicatization

The total shaft water before injections in the upcast shaft was estimated at 80 gal./min. and in the downcast shaft 120 gal./min.

General Method of Work.— The following description was common to both shafts in basic principals. The differing injection detail and results will be given separately. The contractors arrived on site early in December, 1958, and completed the work early in August, 1959. The contractor provided a master sinker, a chargehand sinker, and six men; this was reduced to four sinkers mid-way through the period to reduce the cost of the work, any additional work being done by NCB shaft personnel.

One shaftsman was provided by the NCB for signalling purposes throughout the duration of the repair period. In addition, during the pit holidays in August, 1959, when a concentrated period of 12-hr. shifts was worked in the shafts, six NCB shaftsmen worked with contractor's men to complete the sealing. Work then commenced at the beginning of December, 1958, and the plant was installed in the 727-ft. inset.

Method in Tubbing Section.—The injection plant consisted of two Evans 12-in. by 9-in. by 2-in. double-acting ram pumps, two Foraky colloidal grout mixers for secondary mixing, and two primary mixing tanks. The proposed initial method of conveying injection liquids from pumps to the tubbing via the 2-in. dia. high-pressure pipes, proved costly in time to install. It was, therefore, decided to use 1-in. internal diameter flexible rubber hose, with bedded reinforcing, tested to a pressure of 1,000 lb./sq. in. These hoses, in 60-ft. lengths, proved entirely satisfactory and offer two main advantages over the rigid pipes—ease and speed of transportation and installation and speedy removal for cleaning at the end of injection periods and in the event of blockages. Altogether nearly 1,200 ft. of hose of this type was used during the contract and showed remarkably little wear in spite of the corrosive chemicals used.

In the centre of each tubbing segment, a grout hole of 1-in. nominal dia. is provided, sealed by a 1¼-in. taper plug. Initially, breaching the tubbing was carried out by drilling a ½-in. dia. hole through the taper plug to prove the grout behind before removing the plug. It may be mentioned in passing that this boring of pilot holes was discontinued early in the downcast shaft, when it was discovered that a sandy grout behind the tubbing was sufficiently solid to resist the pressure behind the tubbing while a cock was fitted.

On removal of a plug, a 2-in. cock was fitted to a grout hole and boring done through the cock to the water-bearing sand. Boring equipment consisted of a percussive Holman Silver 8 drill and ¾-in. hexagon drill rods with 1⅛-in. dia. T.C. bits. Air supply was from the 727-ft. inset via flexible

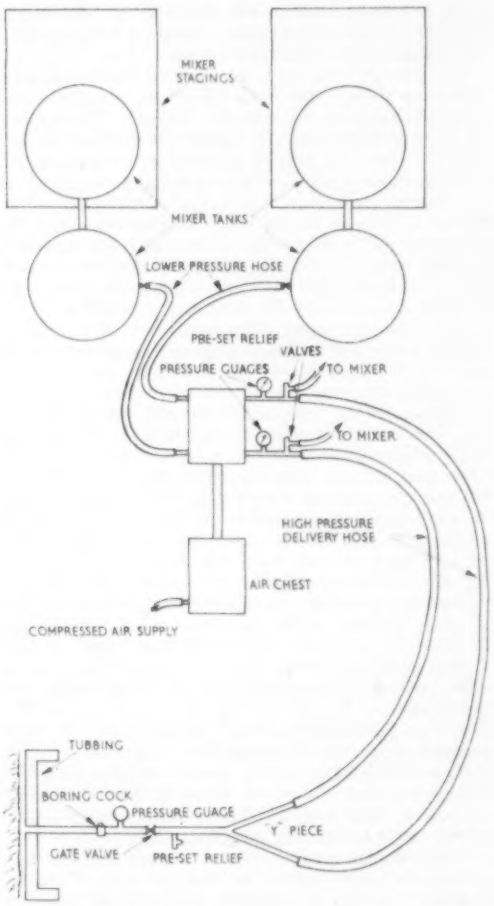


FIG. 4.—INJECTION CIRCUIT USED FOR SILICATIZATION AT BETTESHANGER COLLIERY.

rubber hose. When water or water-bearing sand was reached, at depth from 6 in. to 4 ft., the drill was forced out by the pressure. The hole was then allowed to " blow " for sampling before closing the cock. A pressure gauge was then fitted to the cock and pressure reading taken, after which the hole was ready for injection. Pressures were in line with results from the test period, the maximum being 225 lb./sq. in.

All shaft work was carried out from the cages in each shaft, the cage tops being fitted with folding flaps which provided a small, but adequate, platform for most of the boring and bolt replacement. To compensate the cage clearances, brackets were hung from the tubbing to provide additional coverage to reach the difficult parts of the shaft. Due to rope guides it was necessary to anchor the cages to the tubbing when boring. Cages were controlled by

gong signals to either the onsetter or banksman. Injection progress was communicated by telephone from cage top to the 727-ft. inset.

For cement injection, one flexible hose was used and one pump, the hose being connected to the injection plug via an injection T-piece. The process of cement injections are widely known and further comment beyond a brief description is unnecessary.

When preparing to inject a leaking patch, holes are bored and injection takes place only when water is located in the hole. Dependent upon the pressure the walling can stand, and the pressure against injection, the grout consistency or proportion of cement to water is varied. A plug cock is then wedged into the hole and coupled via hose to the injection pump. The grout is mixed in tanks coupled directly to the pump. All injections from the 727-ft. inset were controlled in the interests of safety by the master sinker, who was the specialist for the silicatization, and was skilled in the fine control required. A sketch of layout of the equipment at the 727-ft. inset is shown in Fig. 3.

In view of the pressure limitation of 300 lb./sq. in., pump capacities were too great for silicatization. It was decided, therefore, to modify one pump to handle both calcium chloride and sodium silicate. This was done by removing the suction and delivery connecting manifolds and using each half of the double-acting pump as a separate unit. The system worked well provided care was taken thoroughly to clean the pump after use. It was found that removing and oiling the ball valves after each usage greatly assisted finely controlled injection.

All parts which handled calcium chloride were painted red; this is especially important, for if the two chemicals are in contact with each other before they actually enter the mouth of the injection hole, they solidify with extreme rapidity and could result in serious pump damage.

Each liquid was conveyed separately by hose to the injection point at the tubbing, then by Y-piece through a specially controllable injection nozzle, which in turn was connected to the 2-in. cock in the tubbing. The Y-piece was fitted with a pre-set relief valve, set to unload at 300 lb./sq. in. This ensured no breach of the stipulated maximum. As a further precaution, similar valves were fitted to the delivery sides of the pump. Two pressure gauges were fitted to the pump to ensure accuracy. The injection circuit for the silicatization is shown in Fig. 4.

No precedents for specific gravities of the calcium and soda liquids were known by the master sinker for similar conditions. Hence it was essential to proceed with absolute caution. The gravities of the liquids measured by Twaddle hydrometer were influenced by:—(*a*) The quantity which could be pumped within the 300 lb./sq. in. pressure limit before solidifying; (*b*) the amount of leakage within 10-ft. radius of the injection point.

Principle of Silicatization

The solution of calcium chloride and sodium silicate precipitate quite readily upon contact with each other, according to the reaction:—

$$Na_4\ SiO_4 + 2\ Ca\ Cl_2 = 4Na\ Cl + Ca_2\ SiO_4.$$

A white "jellified" material (calcium silicate) forms immediately, which soon solidifies into a white crystallized mass, which is highly impervious. Dependent upon the setting time required and speed of flow of injection, the specific gravities of the liquids are varied. Naturally, in practice wide variations are met with to cater for differing conditions. The specific gravities are determined by Twaddle hydrometer, and the different Twaddle co-efficients relate directly to the specific gravity of the solution. The success of silicatization is determined by the skill and experience of men employed, who, through constant use, know invariably the correct consistencies to use, and very often mix the chemicals with water in direct ratios, *e.g.*, 10 to 1; 5 to 1; 4 to 1; and so on.

These direct ratios are quoted often in this paper instead of Twaddle readings, but they have a direct bearing on the specific gravities of the liquids and are checked with the hydrometer. The chemicals are therefore mixed in the primary tanks to the required specific gravity, then transferred to the secondary tanks for injection, while mixing takes place again in the primary tank.

It will be realized there are finer limits to which silicatization can be practised in the circumstances at Betteshanger than with cement injections; the comparative low rate of flow against the high-pressure calls for a good deal of skill and practical experience to ensure adequate quantities are injected before the chemicals solidify and block off the injection hole.

Method of Injection in Other Shaft Regions

Injections in the region of the 1,900-ft. inset were naturally tackled from that inset in a similar manner as with the 727-ft. inset. Sections of the shaft not in easy reach from these insets had to be treated by mid-shaft injection procedure, which meant loading pumps, materials, and equipment on to the cage. It will readily be understood that this method took a good deal of time, and variation of it tried out from the 727-ft. inset in No. 2 shaft was considerably quicker.

In this method, following an ingenious suggestion of the master sinker, the pump was fitted to a trolley having pit rail gauge and run on to the cage at surface level. The chemicals or cement continued to be mixed at the 727-ft. inset, where all services were readily available and were then conducted via high-pressure hose to two 40-gal. drums acting as receiving tank on the cage top, and thence assisted by gravity to the pumps. This method was far speedier, more efficient, and left more room for movement on the cage top, while greater quantities could be injected, depending on requirements. As against the orthodox method longer injection periods were maintained. When injections were completed, pumps and equipment could be taken straight to the surface for cleaning, the shaft being released for inspection prior to normal use.

SHAFT INJECTIONS AND RESULTS

Upcast Shaft

Installation and testing of pumps and lowering chemicals to the 727-ft. inset was started on December 16, and completed by December 20. Repairs to the tubbing ring section were carried out from December 15 to 29. This involved a detailed inspection of all the tubbing, which revealed the necessity for much preliminary repair work such as caulking and tightening rings and bolts and cleaning garlands before the main part of the job could be undertaken between the rings 15 to 29, inclusive, which were leaking badly. Excluding the 15th to 29th ring section, 400 to 500 bolts were either tightened up, replaced, or caulked.

Some leakages were in the region of 15 gal./min. Water was found issuing from the fan-drift inset, which made leak detection difficult. This water and silt which had collected was cleared out. The garland at 720-ft. level was blocked and the "bleed" pipe also blocked; both were cleared and put in working order. The rings 15 to 29 inclusive had their plugs removed on the west and east sides and were fitted with 1-in. plug cocks ready for injecting. At the end of these repairs, water was reduced by approximately 50 gal./min.

It must be emphasized at this point that tightening and caulking in the tubbing was not carried out as a measure permanently to check the leakage in those regions. Had not the leakages been stopped or considerably reduced first in these regions, the injection cement or chemicals would simply have run out into the shaft under pressure from behind the tubbing. Caulking was necessary to ensure the injections stayed behind the tubbing to ensure a permanent seal.

Injection Work in Tubbing.—This was confined between the rings 15 to 29 and by January 17, 1959, the water was reduced to a gallon per minute. Most of this, coming from a cracked tubbing corner in the 26th ring, was reduced to 2 pints/min. on January 29 and was finally sealed by January 31. To ensure against further troubles, the 28th ring was injected on February 1. All that remained appeared as a "gentle sweating" which could have been due to condensation at this point in the shaft; but no leakages were observed. On the same day all valves were removed and the tapered plugs replaced. Nearly all injections were done through existing plugs after initial caulking and tightening.

All other parts of the tubbing appeared dry, although a leaking expansion joint on the rising main made observation difficult.

Further Inspections after Sealing of Tubbing.—It was now obvious that, although the major leakages in the tubbing had been sealed, there were many leakages in the concrete lining of the shaft below in the Coal Measures. These leakages were severe and scattered over the shaft. Leakages were now obvious in many grout rings between lengths of walling and also at numerous points where bunton girders and cable sockets were fastened. The 1900-ft. inset also had many major leakages in the shaft walling. It was decided then to extend the contract to treat the walling down to the No. 7 Seam inset and, as a precautionary measure, inject the 58th to 61st tubbing rings to ensure a seal at the Hastings beds.

Injections at 1,900-ft. Inset Level.—Water at 4 to 5 lb./sq. in. was issuing mainly from very poor quality brickwork 20 ft. below the inset floor and in the inset itself. Some 81 cwt. of cement were injected in 12 holes at 250 lb./sq. in., and the area became dry.

Injections at 1,850-ft. Level (West Side).—Two holes were bored in a leaking patch, standpipes were fitted and caulked in, and 18 cwt. cement injected at 120 lb./sq. in. The shaft was dry, but water was showing 4 yd. back in the dumb drift at this level. This work was done from the 1,900-ft. inset.

Injection Between 1,020-ft. Level and 1,850-ft. Level by Midshaft Injection.—In all, 46 holes were bored at leakage points, which were mostly at bunton sockets. Small quantities of calcium were used to hasten hardening of cement.

Injections of the Hastings Beds.—The 727-ft. inset was brought into use again, and three ranges of 1-in. high-pressure hose were installed at the 1,015-ft. level, which is the base of the tubbing; one hose was used for calcium chloride, one for sodium silicate, and the third for either compressed air or water. Two holes were bored in each of the 58th, 59th, and 60th tubbing rings; calcium chloride and sodium silicate was injected in equal parts. Trial holes failed to locate water.

The Hastings section was then considered dry and further treatment unnecessary. The shaft was then inspected and the amount of water was estimated at less than a gallon per minute free falling and a maximum of 5 gal./min. overall in the shaft. Where injections had taken place at the 1,900-ft. inset, it was obvious the water had been pushed backward and was breaking in further in the inset. Doubts existed regarding several bad walling lengths in the shaft, where concrete was not sufficiently thick to permit injection and several lengths of patchy concrete in the Coal Measure sector of the shaft were also unfit for treatment. The shaft at this time was, however, reasonably dry and withdrawal took place.

Downcast Shaft

Work on Tubbing—15th to 29th Tubbing Ring Section Preparation.—As previously recorded, the shaft was cold and very wet, but the summer period helped and a survey was made by the contractors and the author, and although from the 200-ft. mark observation of leakages below were difficult due to the amount of water in the shaft, the really excessive leakages in the tubbing were picked up. In the remainder of the shaft it was difficult to assess due to the amount of water from above. The pit bottom was severely wet, water being carried out into the air stream on either side of the shaft for about 25 yds.

The preparation work consisted of installing three flexible ranges from the 727-ft. inset. The pumps and equipment were already there, last being used for the Hastings section of the upcast

shaft. The whole of the shaft was scheduled for treatment, and it was decided to tackle the tubbing first.

Injection of the 15th to 30th Tubbing Rings.—These injections went particularly well and over 30,000 gal. of calcium chloride and sodium silicate were injected at 10 to 1, 5 to 1, and 4 to 1 ratios, and 81 holes were bored through plug holes in the tubbing for injection purposes. At completion the tubbing was completely dry.

The bolts in rings 1 to 15 were noticed to be extremely corroded, a point of interest which will be dealt with later. These bolts were scaled; all other bolts were in perfect condition. Injection pressures exceeded 300 lb./sq. in. on occasions. This was done when it was proved that a substantial walling of silicatized material was protecting the tubbing, and in the instances referred to it was necessary to increase pressure to inject sufficient quantities against the pressures behind the tubbing. The chemicals would have had to be further diluted to conform with the 300 lb./sq.in. limit and it would have been impossible to inject sufficient material to form an effective seal.

Work on Concrete Linings.—This was divided into two phases:— (1) First length, from 0 to 600 ft.; (2) second length, from 1,100 to 1,900 ft. This also included some repair work at 1,350 ft. and a small drainage sump at 1,900 ft. All the injections were carried out either from the top of the cages or from the 727 and 1,900-ft. insets which were convenient bases for locating the materials such as calcium, silicate, or cement.

No special difficulties were encountered apart from some reinforcing steel found in the concrete in the top section of the shaft between 400 and 450 ft. and the obvious need to have the cage immobilized by being fastened to the walls as much as possible while exercising pressure on the drilling tools. Some 164 holes were bored in these regions and about 58 tons of cement, 500 gal. of silicate, and 140 gal. of calcium injected.

Supplementary Work.—As and when encountered in the course of normal duty, the following supplementary work was undertaken:— (1) The scaling of all corroded bolts and nuts between the first ring and No. 14 ring; (2) caulking of cracked concrete previous to injection; (3) a bad concrete patch at 1,350 ft. jiggered out and re-concreted; (4) a small sump at 1,900 ft. was constructed and a drainage pipe laid to the 1,900-ft. lodgement.

During the sealing of the downcast shaft, a meeting was held when it was decided to fix a closure date for the job at the end of the pit holidays. This decision was reached allowing for concentrated work in the shafts over the pit holiday period. The advantage of having the shaft constantly available to the contractors considerably speeded the job and reduced the overall cost of the work. The contractor had only four sinkers and a master sinker for this period and the NCB shaft team of six men combined with the contractor's men in working the concentrated 12-hr. shift period. It is of interest to note that the NCB shaftsmen readily adapted themselves to the work and earned the respect of the master sinker by their efforts. The experience they gained during this time will no doubt stand them in good stead when dealing with leakages in the walling which may occur in future.

Upcast Shaft—Additional Injections in the Tubbing.—To ensure finally that the sealing of the tubbing would be permanent, further chemical injections were carried out, but difficulty was encountered in getting the chemicals in against the pressure and, as the tubbing sector was dry, the work was curtailed. During this period injections were still being carried out in the downcast shaft.

Inspection at Completion of Sealing Operations

When the contractors completed operations in both shafts, *i.e.*, August, 1959, inspections were carried out and in the downcast shaft only a trickle of water was observed above the 727-ft. inset, which was being caught in the garland at 720-ft. level. The tubbing section was completely dry. Even to the "meet" of the cages, although damp patches appeared on the concrete walling, the shafts were completely dry with no falling water except for a few small leakages, too small to be measured, that were observed and were being caught in the garlands in the Coal Measures. Only in the 1,500-ft. to 1,600-ft. section was any water getting into the shaft and free falling; here the walling appeared damp in grout sections and at bad concrete patches, but definite leaks could not be traced. At the pit bottom, only a few, occasional drops of water fell on the west side of the shaft. The total amount of water "free falling" could not have been more than a gallon per hour. There was no water sweeping into the decking insets.

In the upcast shaft, however, conditions had deteriorated in the Coal Measures and there were again many leakages, mostly too small to observe, running out of the walling, but small leakages under pressure were allowing water to get airborne. These conditions had been noticed as a steady deterioration while work proceeded in the downcast shaft, but in the tubbing section no leakages were observed. It was, however, quite noticeable that the insets at 1,575 and 1,900-ft. levels and in the dumb drift in the upcast shaft, where water had been leaking at the insets, the water in these regions had been pushed back into the insets themselves. In the 1,575-ft. inset and 1,900-ft. inset, water was coming out of the floor under pressure as well as the roof, but these makes of water were in positions to be dealt with conveniently and caused no concern.

The total quantity of water leaking in the downcast shaft at this time, *i.e.*, the quantities "free falling" and quantities collected in garlands, was estimated at 2 gal./min. In the upcast shaft the estimated quantity was 25 gal. Of these leakages only 1 gal. was "free falling" in the upcast shaft, and a gallon in the downcast shaft.

This compared favourably with leakages found

before which were:— Downcast shaft, total leakage 80 gal./min.; upcast shaft, total leakage 120 gal./min.

Results of Surveys in Shafts—November, 1959

After three and a half months the position in the upcast shaft had changed very little, but the downcast shaft had sprung a few leaks in the Coal Measures, which at the present time are being caulked by hammering lead wool into the small leakage holes in the concrete.

The total quantities of water at the present time are estimated to be:—

Upcast Shaft.— 1 gal./min. "free falling" in the shaft. Total quantity from all sources (garlands, sumps, etc.), 25 gal./min.

Downcast Shaft.—One pint per minute "free falling" in the shaft. Total quantity from all sources (garlands, sumps, etc.), 5 gal./min. Total quantities in both shafts, 30 gal./min.

This shows the deterioration in the Coal Measures in both shafts, but the degree of deterioration is not very extensive and is taking place in the "suspected" concrete walling lengths, where adequate injection could not take place without repairs to the lining beforehand. The tubbing sectors remain dry. Further deterioration in the position in the shafts is not expected and if any occurs in the concrete lining it should be able to be dealt with successfully by NCB personnel. The shaft will be surveyed at six-monthly intervals to record any deterioration.

Conclusions and Observations

In the tubbing sections, it can be safely said that success of the project was greater than expected, and far greater than many people with long experience of Betteshanger shafts orginally thought possible; but in the concrete linings below the tubbing sections the results have been restricted by the conditions of the linings, but relatively "local" injections in these regions have been successful in reducing the quantities of water, most of which is now caught in the garlands. It must be realized that the problem in the Coal Measures is far greater than originally visualized and will prove very difficult to solve.

Regarding conditions of the walling in the Coal Measure sections it should be stated that although sinking records show a substantial 18-in. wall, this is not so in fact, as has been proved by bad concrete patches, poor grout rings, and boreholes showing only 4 in. of walling in places. To inject these lengths successfully is impossible with the pressures required and would be a risky undertaking. The only ways to ensure absolute success are too costly to contemplate. Large sections of walling in some cases would have to be removed and replaced or completely lined with steel segmented rings secured by "roof" bolts to withstand the injection pressure required. It is now NCB policy on all major sinking to employ an official in the capacity of a "clerk of works," as in civil engineering practice, to ensure that the work is carried out in exact accordance with the specification. Had this been the case in Betteshanger shafts, the sealing operations would have been more successful, as the effectiveness of such work is determined by the strength and quality of shaft linings.

The results of injections, however, has permitted the majority of the original intentions to bear fruit. (*a*) The shaftsmen team strength, which was originally seven, is now reduced to five and will shortly be only four. (*b*) The winding ropes in both shafts are now greased throughout their entire lengths. Hitherto, it was impossible to lubricate the ropes. In the downcast shaft all guide ropes are lubricated, although in the upcast shaft, due to the water still present and humidity, it is impossible to get the lubricants to stay on the ropes for more than a limited period. (*c*) Working conditions are far better at the decking levels and in the shafts, and the water money payments made before have been considerably reduced. (*d*) The differential between the "wet" and "dry" bulb readings at the bottom of the downcast shaft has increased by from 2 deg. to 3 deg. from similar readings over the past four years. (*e*) The quantity of shaft water delivered to the main pumps has been reduced by 140 gal./min.

The results achieved, in the author's opinion, are conclusive enough to prove the expenditure incurred was justified.

With the drying out of the upper region of the downcast shaft, a 4-in. and a 10-in. range of pipes, which had previously been thought to be quite sound, were found, on inspection, to be in very poor condition and constituted a hazard. It was a direct result of the sealing that the faults of the pre-injection period were discovered and they have since been removed.

In the tubbing section of the downcast it was also found that all the bolts in the first 15 rings were entirely corroded and were just a solid mass of rusty scale, although the portion of the bolt in the tubbing segment was intact; the tubbing segments themselves in these 15 rings were in good condition. This was a remarkable discovery as all other tubbing bolts and segments in both shafts have suffered little or no deterioration.

The only reason for this phenomena seems to be that water in contact with these first 15 rings was slightly acidulated and the extensive corrosion was caused by electrolysis. The leakages in the tubbing below the 15th ring probably kept the acidulated water out of contact with the rings below, which were unaffected.

It is the author's opinion that the water from the chalk could not be acidulated to affect the bolts in this way without some other source of contamination. One can only presume this contamination is affected by the sulphur dioxide, which is borne in the air in the downcast shaft during winter months when large braziers are erected at the downcast shaft top to prevent icing in the shaft.

The details given in this paper have been recorded as accurately as possible, and if future work in the shafts becomes necessary, the object of placing the facts of the recent work on record will be of assistance to the people concerned, and it may be hoped to others who may have similar shaft problems at their collieries.

The author wishes to thank the National Coal Board for its kind permission to publish this paper and to record his appreciation to the supervising engineer, Mr. Thonet, and the master sinker, Mr. J. L. Baird, of the Foraky Boring & Shaft Sinking Company, Limited, for the information obtained from the company's records, and also to the divisional and Betteshanger staff who were connected with the work and supplied details of the sinkings. The views expressed are the author's and not necessarily those of the NCB.

Tension in Conveyor Belts

MAXIMUM tension in conveyor belts is the essential criterion which governs the choice of the carcass for the design and construction of the belt. An exact knowledge of this tension is therefore desirable, and in the February issue of Revue de l'Industrie Minerale a contribution to the study of the tensions in belt conveyors is made by M. P. Dumonteil.

The author states that the standard methods of tension calculations, based on the coefficient of friction, may lead to either overdimensioning of the belt or to an inadequate margin of safety. Calculations based on this method can only be used for short conveyors or to effect an approximate layout.

The author suggests that an examination of the basic resistances should be grouped into two categories, *i.e.*, those which are distributed over the length of the conveyor (primary resistances) and those which are applied at certain well-defined points (secondary resistances). The former include the resistance of the idlers to rotation, the rolling resistance of the load on the belt (load rearrangement and belt deflection between two idlers), and the resistance created by the forward throw of the troughing idlers.

The secondary resistances comprise the friction in the drum bearings, wrapping of the belt over the drums, the friction created by the cleaning devices, and the acceleration of the material. It is the sum of all these forces which determines the tension or horizontal force which has to be exerted in order to set the belt in motion. In this way, German investigators have established formulas which give better evaluations.

PROTECTIVE CANOPY AND ARCH SETTER

UNDERGROUND roadways driven by explosives raise the problem of immediately supporting the roof exposed by shotfiring until the debris can be removed and permanent steel arches installed. This long-standing problem contributes to underground injuries.

The National Coal Board's Central Engineering Establishment has developed the protective canopy and arch setter shown in Fig. 1.

Steel mesh panels fit in the canopy for supporting the exposed roof. The canopy is raised by means of parallel motion supporting arms and a compressed-air winch and chain. Crown sections of the permanent three-piece arches can be lifted into position on the canopy. The whole equipment can be withdrawn to a safe distance during shotfiring and, to facilitate this operation, it runs on brackets slung from the arches of the completed roadway.

Collieries, engineering firms, or contractors, wishing to manufacture this equipment, for service under the NCB, will be supplied with drawings on request to the Central Engineering Establishment, Ashby Road, Stanhope Bretby, near Burton-on-Trent.

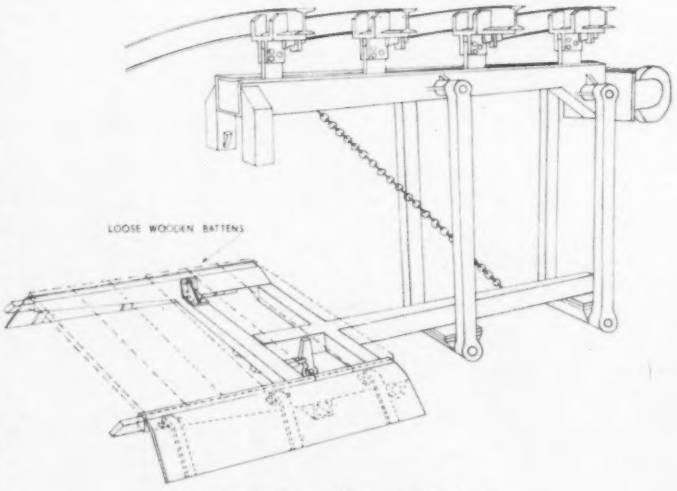


FIG. 1.—BRETBY MARK IIIA CANOPY.

Metallurgical Progress

Some abstracts from recent reports on research and development, at home and abroad

How Radiation Affects Engineering Materials. R. E. BOWMAN. (Materials in Design Engineering, 1960, Vol. 51, No. 7, pp. 119-126.) Structural metals are not as susceptible to radiation damage as non-metallic materials. Detectable changes in the mechanical properties of metals do not appear until the integrated fast neutron flux reaches a level of about 10^{19} n per sq. cm., but physical properties can be affected at lower levels. The magnetic properties of some ferrous alloys deteriorate appreciably at integrated fast flux levels of 10^{17} n per sq. cm. The effects of radiation in metals are analogous to that of cold work, although the overall effects can be minimized by decreasing radiation dose, and/or increasing temperatures during irradiation. Radiation damage can be repaired or removed by annealing. Two important secondary effects are induced radioactivity and gamma heating. Cobalt-bearing alloys become sources of gamma radiation which may make them unsuitable for some applications even though their structural characteristics are not significantly affected. If sufficient cooling is not provided, high gamma fluxes can cause melting. It is shown that fast-neutron irradiation increases the yield strength in a manner analogous to cold working.

The yield strength of annealed metals is approximately doubled after irradiation. Neutron irradiation also increases the tensile strength of metals, but to a lesser extent than it does yield strength. Loss of ductility can range from one fifth to one third or more. Irradiated carbon steels tend to lose their yield point. Neutron irradiation affects the fracture behaviour of structural metals and tends to increase transition temperature. As neutron bombardment causes atomic displacements, it increases the ability of a metal to resist indentation. Neutron irradiation produces a noticeable increase in electrical resistivity, especially at lower temperatures where the effects are unable to anneal out. For face-centred cubic metals, the increase in electrical resistivity is inversely related to original resistivity.

Closed-circuit Television for Industrial Applications. E. C. CARROLL. (Iron and Steel Engineer, 1960, Vol. 37, No. 7, pp. 78-92.) The author examines the present status of television in the steel industry by reviewing some of the applications now in use. Industrial television has provided many answers to problems of material-handling control in steel mills, where the problems concern manpower conservation, observation under difficult conditions, or the rapid co-ordination of information obtained from several points. Television is used on several sintering machines. A dust-tight camera is located at the discharge end of the machine viewing the sinter on the last pallet. The monitor is located in the control panel at the feed end of the line, so that the sinter can be inspected as it approaches and just before it drops into the discharge chute. Many mills use television on the slab-reheating furnaces, both at the entry end and at the discharge end.

New Low-carbon Steel for the Porcelain-enamel Industry. ANON. (Iron Age, 1960, Vol. 186, No. 16, pp. 151-3.) A new one-coat porcelain-enamelling steel saves from 15 to 30 per cent. of enamelling costs. The steel forms a panel which is free from sag, distortion, boiling, and fish-scaling. Porcelain enamelling centres on the firing of glass-like compounds to a steel's surface. In this process, the steel is drawn or fabricated into its final form. The part is then cleaned, pickled, and sometimes flash nickel-coated prior to enamelling. A frit is applied and this dries and fuses to the steel at temperatures ranging from 732 to 870 deg. C. This new steel has a carbon content of 0.003 per cent. or less with about 0.30 per cent. manganese, and can withstand temperatures above 870 deg. C.

Trouble Spots in Sintering Plants. G. R. BAER. (Iron and Steel Engineer, 1960, Vol. 37, No. 7, pp. 93-101.) The author discusses some of the outstanding trouble spots which have been observed in modern sintering plants. The design should meet the needs and a wise choice should be made from among the many alternatives available. The sintering machine requires level support throughout its length. Troughed rubber-belt conveyors are used wherever material, temperature, and plant layout permit, as they are dependable, trouble-free, and economical. The angle of belt conveyors requires design consideration. The maximum angle should not exceed 18 deg.

Belt scrapers are a constant source of trouble, but there is an assembly which has proved superior to many other designs. It consists of two scrapers, each a spring-loaded rubber strip. The first is approximately tangential to the head pulley below its centre line, and the second is approximately radial. Chutes can be a source of trouble involving high maintenance cost. Factors which require careful design are size of opening, length, amount and location of wearing-plate surface, and access for repairs. In the hoppers, it is advantageous to relieve sharp valley-angles by inserting half-round sections or flat plates across the acute angles at the intersection of the side plates. Usually vibrators are used on such hoppers. The importance of proper proportioning of materials, regularity of flow of materials, and maximum permeability of the sinter mix as fed to the sintering machine are well recognized in principle, but troubles have been caused with their reduction to practice.

Industrial Ultrasonics. A. DIXON. (Iron and Steel Engineer, 1960, Vol. 37, No. 7, pp. 107-112.)

Ultrasonics offer unique advantages over conventional industrial methods for soldering, welding, machining, and cleaning. A number of these applications have proved to be practical and economical. All systems of sonic or ultrasonic application employ three main functional parts. They are:—(1) A source of energy—either a mechanical generator or electrically produced pulses converted by a transducer into mechanical energy; (2) a medium of energy transmission which may be a solid, liquid, or gaseous substance; (3) the receiver, which would include the work piece, material, or device to effectively utilize the energy.

For metal-joining applications, the ultrasonic process offers a highly favourable advantage of being able to join a wide variety of metals without the need for a corrosive flux or direct fusion of the metals. In machining applications, ultrasonics provide a unique tool for cutting very hard and brittle materials. The use of ultrasonic cleaning is justified generally only for intricate parts or where other cleaning methods are not effective. The ultrasonic process is becoming established as a reliable method for non-destructive testing. Ultrasonics in a well-designed system presents no health hazard, as the human-ear mechanism does not respond to frequencies much above 15 kc.; the use of equipment at these higher ultrasonic frequencies is virtually noiseless in operation. Proper energy coupling will effectively minimize the noise problem to acceptable limits, even at an audio frequency. A transducer tool provides a mechanical mounting which transmits very little of the energy to the hand of the operator.

Electro-precipitators in the European Iron and Steel Industry. E. BRUEDERLE, C. SCHEIDEL, and H. WERNER. (Blast Furnace and Steel Plant, 1960, Vol. 49, No. 4, pp. 1031-7.) The electrical method of dust precipitation is ideal for reducing the flue-dust nuisance, and for the recovery of valuable materials in the gases. The authors outline the principles of electrostatic dust precipitation and they review the advancements in design and in the characteristic features of electro-precipitator equipment. The cleaning of gas by this means is based on the phenomenon that oppositely charged particles are attracted to each other. The particles are charged by a corona discharge at the high-tension electrodes, after which they drift through a simultaneously existing electric field to earthed collector electrodes, to which they adhere.

The high-tension and earthed electrodes, together with the mechanical-rapping device, constitute the essential components, and are designed for co-ordinated operation. High-tension power is generated by transformers and is rectified by means of selenium rectifiers. Electro-precipitators have made progress in the preparation and dressing of iron ores. After satisfactory results with electro-precipitators, installed after the rotary-sintering furnaces, and with electro-precipitation installations, in eliminating the dust from the waste gases of sintering belts, the advisability of employing electrical-gas cleaning for eliminating sub-micron particles was realized. Electro-precipitators with gas-conditioning towers have proved successful for the Krupp-Renn process. With blast-furnace gas, high separation efficiency is obtained with a gas scrubber, and a wet electro-precipitator. The blast-furnace gas precipitators clean the gas to residual dust contents of 0.002 grain/cu. ft. To achieve a residual-dust content of <0.0004 grain/cu. ft., the gas diverted for the turbines is fine cleaned in an additional wet electro-precipitator. Dry electro-precipitators are used for cleaning gases from cupolas and electric furnaces. Following the success of dry-electrical cleaning of waste gas from LD crucibles, the process has been adopted for bottom-blown converters and for open-hearth furnaces.

A Three-way System Analyses Blast-furnace Top Gases. ANON. (Steel, 1960, Vol. 147, No. 17, p. 106.) As the top gas leaves the stack it passes through the dust catcher, scrubber, and water washer. Then it passes through the precipitators and into the main stove header, where there is a sample line. A diaphragm-type pump is used to draw a continuous flow of gas through a series of filters and into an analyzer. A continuous flow of sample gas through all the analyzer cells ensures rapid analysis. In the gold-coated infra-red cells, the gas is exposed to radiation focused on a series of thermocouples. The molecular structures of the gases determine the wavelengths of infra-red radiation they absorb; measurement of the electrical-energy output of the thermocouples indicates the percentages of carbon monoxide and carbon dioxide in the sample.

A thermal-conductivity cell uses a Wheatstone-bridge circuit to measure the resistance of a heated wire surrounded by the sample gas. The value of this resistance is proportional to the thermal conductivity of the gas; the output signal from the bridge indicates the hydrogen concentration. The output signals from the measuring cells are indicated on a multiple-point recorder which automatically switches from one cell to another at four-second intervals, and records each measured percentage.

The Upgrading of Marginal Ores. ANON. (Steel, 1960, Vol. 147, No. 18, pp. 72-4.) The process converts crushed, non-magnetic material to synthetic magnetite. It permits the separation of magnetic particles from the waste rock with conventional magnetic equipment. When the low-grade ore is heated in a reducing atmosphere, its oxygen content is slightly reduced. A Canadian kiln was fired with bunker "C" oil, but natural gas could be used. Reduction is controlled carefully to prevent the formation of non-magnetic iron oxide or an unsatisfactory yield. A 10-ton/hr. plant will be operated in the United States, with an 88 ft. long by 9-ft. dia. kiln. Using fuel from a gas-producer unit, it will be part of a continuous-concentration process. After cooling and intermeditae grinding, the synthetic magnetite will pass directly into

magnetic separators. It is estimated that a kiln about 164 ft. long and 12 ft. dia. would be required in the smallest production plant. Such a kiln would produce from 60 to 80 tons of ore per hour. An extensive research programme on magnetic roasting has been started. Preliminary studies indicate that travelling-grate machines are well suited to the process. A bed of crushed ore is subjected to the action of a preheated, reducing-gas stream.

Electric-arc Heater Develops Very High Temperatures. ANON. (Iron and Steel Engineer, 1960, Vol. 37, No. 11, pp. 149-150.) The electric-arc heater, with the potential capability to supply a stream of gas at temperatures as high as 11,100 deg. C. and pressures of 15,000 lb./sq. in., can operate for sustained periods of time and at an extremely low level of gas contamination. This heater is considered to be promising as a chemical synthesiser and as a furnace for processing metals with ultra-high melting points. A prototype model of the machine has been operated at a power input of 1,700 kW, but one at 30,000 kW is planned. The temperature into the nozzle has been maintained at 5,550 deg. C., and flow from the nozzle of the unit has reached a sonic velocity of 3,400 miles/hr.

The unit's potentialities as a furnace might make a number of refractory metals available in ingot form. In all of the applications, the success of the arc heater is dependent upon a low level of contamination—this unit has a maximum contamination level of 0.2 per cent. The basic concept of the heater is a scheme in which an electric arc, dissipating megawatts of electric power, can be maintained for prolonged periods of time to transfer continuously thermal energy to a gas passing through the arc. This is done virtually without erosion of the electrodes. Each of the two electrodes, which form the terminals for the arc, consists of a hollow doughnut-shaped ring placed horizontally, one directly above the other. Water is pumped through the rings for cooling. An electric arc is started by drawing it across the gap between the rings, and then rotated around the gap at high speed. Rotation of the arc is accomplished by a magnetic field from d.c. coils arranged around and outside of the heat chamber. This rotation, together with the water-cooling, prevents the electrodes from heating to a point beyond the structural endurance of the material. Air or nitrogen enters the arc chamber and passes into the arc through openings near a watercooled copper heat shield. After leaving the arc the fluid passes through a water-cooled nozzle.

A New Approach to Chipless Machining. ANON. (Steel, 1960, Vol. 147, No. 9, pp. 110-111.) Electrolytic machining has good removal rates, a close control over the contours generated, and is simple to set-up and operate. Shaping is not affected by the hardness or strength of the metal, the one requirement being that the work is capable of conducting electricity. Parts can be shaped in the hardened condition as easily as in the annealed state. The removal rates, governed by the amount of electric current applied, range from 0.05 to 0.10 in. a minute. The rates, higher than conventional electrolytic processing, are attributed to a rapid, thin-film flow of electrolyte which will support a current flow as high as 1,500 amps/sq. in. between the work (anode) and the electrode (cathode). The space between the shaped electrode and the work is less than 0.010 in. The contour of the electrode is reproduced on the work to tolerances between 0.0005 and 0.003.

As no appreciable heat is generated in the work, there are no distortions or stresses, and sections as thin as 0.005 in. have been shaped satisfactorily. The operation takes place inside a closed plastic chamber. Parts are loaded in the fixtures, and inserted in the chamber. The electrodes are positioned, the electrolyte pumps are turned on, the current flow is started, and the automatic feed is initiated, which maintains the gap as the metal is removed. Stainless-steel tools have been used as they resist any corrosive tendency in the electrolyte.

Abrasive Belts Remove Crown from Stainless-steel Strip. W. N. REDSTREAKE. (Iron Age, 1960, Vol. 186, No. 17, pp. 89-91.) Abrasive-belt machines remove the crown from stainless-steel strip up to 28 in. wide. The grinding is done by dual grinders with abrasive-coated belts. The belts run in a flood of sulphur-chlorinated oil at 900 to 1,800 revs./min. Two 60-h.p. vertical grinders, running in tandem, each drive a 30- by 126-in. cloth belt. The belts are all-resin bonded with aluminium oxide or silicon-carbide abrasives. The oil is pumped to each grinding head at a rate of 65 to 100 gal./min. Each coil is kept under an endwise tension of 30,000 lb., and, as it approaches the belt, it is sharply bent at an angle up to 20 deg. Break rolls impart the angle to the coil as it enters and leaves the grinding area. A work-support roll forces the strip against the belt by hydraulic pressure. The contact rolls are knurled steel or serrated rubber.

Industrial Waste Control—Mill Scale. DE YARMAN WALLACE. (Iron and Steel Engineer, 1960. Vol. 37, No. 7, pp. 75-7.) Mill scale represents iron units so its recovery is essential. If settling devices are considered, several possibilities suggest themselves:—(1) More frequent cleaning of scale basins; (2) proper baffling of the scale basin; (3) dry-scale removal and drag removal of large scale under the mills; (4) by-passing of cooling water to reduce the volume of water through the scale basin; (5) redesign of the scale-collection system. The possibilities of each of these methods is discussed.

Data Processing as Related to the Steel Plant. H. R. BERKE. (Blast Furnace and Steel Plant, 1960, Vol. 49, No. 6, pp. 1262-4.) The functions of digital computing systems are:—(1) Input—the computer can accept both the data upon which it is to operate and a complex series of instructions (the programme), which tell it what operations it has to perform on the data. (2) Arithmetic—the

computer has circuits to do addition, subtraction, multiplication, and division. Higher forms of mathematics can also be handled. (3) Logical operations—the computer can compare, mask, branch, etc., where characters or bits characterize the elements being operated upon rather than numerical values as in arithmetic operations. (4) Memory—the computer has the capacity to store information internally, either at random or in sequence, and to retrieve this information as it is required. (5) Output—the computer can organize the final or intermediate results of a programme into a desired format for exit from the system. The format may be a printed report or punched cards or tape.

Benefits from data processing lie in the area of scientific management. If all the data involved in plant operation were passed through a single intelligence centre, many routine decisions could be improved. Firms must be adequately prepared before installing electronic data-processing systems. A pure analysis of the information flow and needs of the company should be made and the results should be the basis for a long-range system plan. The idea of putting information into machine language at the point of origin and checking it at that time, and then never writing it manually or checking it again is a critical one. An example is given of an operating system in a steelworks.

The Swing to All-basic Furnaces. J. H. CHESTERS. (J. Soc. Glass Technology, 1960, Vol. 1, No. 6, pp. 243-50.) Although all-basic furnaces were tried in Great Britain before the war, it is only in the last few years they have proved economical. There were five all-basic furnaces in 1956 and by the beginning of 1960 there were 50. Attempts to justify such furnaces purely on the basis of longer life have proved futile. They can only become economical with faster driving—involving greater fuel input rates with or without oxygen for combustion and lancing.

The types of furnace so far developed are classified into three main groups:—(1) Ordinary all-basic furnaces; (2) all-basic furnaces equipped with oxygen jets or lances; (3) all-basic furnaces redesigned for oxygen usage. With the first group increases of 10 per cent. are usual, but in certain cases increases of more than 30 per cent. have been achieved by *pro rata* increase of fuel input. With the second group, the extra output varies from 20 to 100 per cent., according to the amount of oxygen used, while in the third group output has been aproximately doubled. These changes have a marked effect on refractories consumption. Not only does the total consumption of refractories drop to a half, but the distribution is radically altered, the consumption of basic refractories being roughly doubled, and that of silica reduced from, say, 25 to only 1 lb. per ton of steel. Such levels have been obtained by tight control over oxygen blowing and by design changes in such things as lancing procedure and roof height.

The author discusses furnace construction with a special emphasis on the furnace roof. So far it has not been possible to correlate basic-roof life with any specific cause or property. Given, for example, careful heating up, thermal-shock resistance requirements should not be particularly severe on hot-metal furnaces, but with cold-charged furnaces it may well play an important role. That creep is not always a cause of failure is shown by the long lives (over 2,000 heats) given by chrome-magnesite bricks of normal creep resistance in certain furnaces operating at high temperatures. Finally, operation of the furnace is discussed. The current view is that all-basic furnaces should only be installed where substantial increases in hourly tonnage are required. If these are achieved then output credits are gained and frequently also a fuel saving.

Combustion and Heat Transfer in the Open-hearth Furnace. C. HOLDEN. (J. Soc. Glass Technology, 1960, Vol. 1, No. 6, pp. 251-9.) Although the basic principles of Siemens original regenerative furnace have changed very little, outputs and fuel economy have improved considerably. Much of this improvement is due to increases in firing rate, but the use of superior fuels and improvements in furnace and burner design have also played their part. The author compares various fuels and examines the effect of preheat level and the use of combustion oxygen. The heat available can be increased by:—(1) Increasing the fuel input; (2) increasing the preheat temperature; (3) using oxygen for combustion; (4) decreasing the amount of atomizing agent used; (5) changing the atomizing agent, *e.g.*, air instead of steam.

The actual amount of heat transferred depends not only upon the heat available but also on the bath coverage by the flame and the flame emissivity. Bath coverage can be increased by increasing the angle at which the flame hits the bath or increasing the number of flames used. The overall emissivity of the flame can be increased by carburizing, *e.g.*, pitch with coke-oven gas or carbon with fuel oil. Although the fuel jet is by far the most important aerodynamic feature of the open-hearth furnace the flow patterns of the combustion air and waste gases also have a marked effect on the combustion and heat transfer. An even distribution of combustion air around the burner is desirable, and recirculation of waste products over the flame should be eliminated.

A SHIMMERING COLUMN of light 45 ft. high, made up of the five geometric shapes from which Plato imagined the elements to be made, will greet visitors to the British section of the International Labour Exhibition to be held at the Palazzo del Lavoro, Turin. The provisional dates of the exhibition are May 6 to October 31. Produced for the Foreign Office by the Central Office of Information, the UK section will be the first national contribution to be seen by visitors. In 15,500 sq. ft. of space on two floors of a vast concrete and glass "Palace of Labour," Britain will show both the past and present achievements of science.

BRITISH IRON AND STEEL INDUSTRY

Translation Service

FOLLOWING is a list of some new translations available from the Iron and Steel Institute under its translation service scheme. Translations are all classified by numbers, and these should be quoted on applications, which should be addressed to the institute at 4, Grosvenor Gardens, London, S.W.1.

1588: "Calculating Heating Conditions for Steels to Avoid Thermal Stress Cracks." S. G. GOLOVANOV. Kuznechno-Shtampov (Moscow), 1959, 1 (10), 30-36. £6 5s.

1911: "Embrittlement and Rupture of Steels Under Stress in Saturated Solutions of H_2S." E. HERZOG and E. MALINOWSKI. Rev. Mét. Mém. Sci., 1960, 57, July, 535-549. £6 15s.

1942: "The Rolling Process in the Light of Some New Test Results." I. M. PAVLOV. Freiberger Forschungsh. Met.-B. 48, 1960, 26-56. £10.

2011: "The New Bremen Iron and Steel Works for the Klöckner-Werke A.G. in the North Sea Coastal Region." I. W. HEEMEYER and W. ASBECK. Stahl Eisen, 1960, 80, Oct. 27, 1443-48. £3 15s.

2019: "Operation and Modernization of Pilger Hill Feeders." S. N. KOZHEVNIKOV, *et al.* Izvest. VUZ Chernaya Met., 1959 (3), 143-55. £6 5s.

2030: "A New Non-destructive Electro-magnetic Testing Procedure." F. HAVELKA. Wissenschaftliche Z. der Hochschule für Schwermaschinenbau Magdeburg, 1959, 3, Dec., 189-193. £2 15s.

2031: "Evaluation of Defects in Welds by Means of Ultrasonics." Z. PAWLOWSKI. Wissenschaftliche Z. der Hochschule für Schwermaschinenbau Magdeburg, 1959, 3, Dec., 203-206. £2 10s.

2032: "Design and Performance of a New Ultrasonic Probe for the Examination of Cast-iron Pipes." J. WEHR. Wissenschaftliche Zeitschrift der Hochschule für Schwermaschinenbau Magdeburg, 1959, 3, Dec., 207-214. £5.

2037: "Removal of Dust from Converter Brown Smoke Using a Wet Electrofilter." K. GUTHMANN. Stahl Eisen, 1960, 80, Nov. 24, 1803-05. £2.

2039: "Temperature Measurement in Steel Melts with a New Type of Immersion Thermocouple." H. J. MEERKAMP VAN EMBDEN. Giesserei, 1960, 47, June 16, 328-9. £1 5s.

2056: "The Resistance of a Blast-furnace Carbon Lining to Attack by Certain Agents." J. JANOWSKI and E. MAZANEK. Neue Hütte, 1960, 5, Dec., 743-752. £5 5s.

2058: "A Brazing and Braze-welding Process Under a Vaporized Flux." J. DELFORGE. Prat. Soud. (Brussels), 1959, 13, Feb., 25-29. £2 5s.

2081: "Remarks on Optimum Heating and Cooling Rates During Sintering of Hard Alloys of the WC-TiC-(TaC)-Co System. M. PETRDLIK, *et al.* Hutnické Listy (Prague), 1957, 12 (7), 617-618. £3 5s.

1835: "Research on the Hot Deformation of Steels. II.—Hot Torsion Tests: Conclusion." C. ROSSARD and P. BLAIN IRSID Publication, 174 bis, series A, 1958, Oct., 1-83. £10.

1876: "Determination of Stresses During the Forming of Metals by Pressure." I. YA TARNOVSKII, *et al.* "Obrabotka Metallov Davleniem (Sbornik Statei). Vypusk Tretii" ("The Working of Metals by Pressure") (collection of articles), issue (3). Moscow, Metallurgizdat, 1954, 5-22. £4 10s.

1980: "Practical Results Obtained Regarding Knurled Roll Passes." O. BARTH. Neue Hütte, 1960, 5, Aug., 488-490. £2 5s.

2001: "Breakages of Crane Hooks and Ladle Yokes and How to Avoid Them." G. WILL. Stahl Eisen, 1954, 74, Aug. 12. 1062-1069. £5 10s.

2038: "The Production and Application of Magnesia Alumina Bricks for Roofs of Open-hearth Furnaces in China." ZONG-SHAN GUAN and YUN-HE WANG. Gangtie, 1958, Sept., 19-24. £14.

2054: "Study of the Strain-ageing of Mild Steel and of High-purity Iron by Age-hardening and Reversion Tests." M. NACKEN and W. HELLER. Arch. Eisenhüt., 1960, 31, Feb., 103-111. £5 10s.

2072: "Problems in the Design of Casting and Transport Bogies for Ingots and Slabs. W. KURSCHEIDT. Stahl Eisen, 1961, 81, Jan 5, 58-60. £2 5s.

Translations on Creep

"The Behaviour of Heat-resisting Steels During Creep Testing at 500-700 deg. C."—Papers and contributions to the 1957 meeting in Düsseldorf, published in Archiv. für das Eisenhüttenwesen, 1957, 28, May-June, 245-344, and November, 671-726, have all been translated by BISITS. Details on request.

"Long-time Behaviour of High-temperature Steels."—The following papers presented at the June, 1960, meeting in Düsseldorf have been translated:—

1804: "Scatter of Creep Strength of Steel X 22 CrMo (W) V 12 1, a Joint Evaluation of German Tests." R. SCHINN. (Paper No. 6.) £3 5s.

1914: "Effect of Stability of a 0.5 Per Cent. Cr-0.5 Per Cent. Mo Steel on the Rupture-time Curve at 500 deg. C. L. BACKER, *et al.* (Paper No. 12.) £2 15s.

1886: "The Development and Introduction of a New Ferritic Steel for Superheated Steam Pipes and Superheater Tubes." O. L. BIHET, *et al.* (Paper No. 13.) £4.

1855: "The Effect of Initial Structure on the Long-time Test Behaviour of 2¼ Cr 1 Mo Steels at 550 deg. C." TH. GEIGER. (Paper No. 16.) £4.

1915: "Effect of the Cooling Rate and the Cross-section of Castings on the Characteristics at Room Temperature and on the Creep Strength of a Cast Steel of 1 Per Cent. Cr, 0.9 Per Cent. Mo, 0.3 Per Cent. V." K. GUT and H. LÜLING. (Paper No. 17.) £3 10s.

1916: "High-temperature Characteristics of Cr-Mo-V Steels: The Influence of Thermal Treatment. Comparison Between the Results Obtained on Rotors and on Bars for High-temperature Bolts." C. ROQUES. (Paper No. 22.) £2 5s.

1887: "The Notch Sensitivity of a Cr-Mo-V Steel for Bolt Work Operating at Elevated Temperatures." X. WACHÉ. (Paper No. 23.) £3 15s.

1803: "Metallographic Investigations on X 8 CrNiNb 1613 After Creep Tests at 750 deg. C." A. SCHRADER and A. KRISCH. (Paper No. 27.) £6 10s.

1888: "Swedish Proposals for Definitions of Terms Used in High-temperature Testing and for the Corresponding Abbreviation Symbols (in particular for Static Load Testing." G. ENGSTRAND. (Paper No. 34.) £1 10s.

714: "The Carbides and the Creep Behaviour of Cr-Mo-V Steels." W. KOCH, *et al.* Arch. Eisenhüt., 1957, 28, Aug., 445-459. £5 10s.

919: "A Creep Machine Under High Vacuum and for Low Stresses." A. GAUTIER. Rev. Mét., 1958, 55, Jan., 9-16. £3.

1070: "Changes in the Structure of Austenitic Steels in Creep Rupture Tests." W. KOCH, *et al.* Stahl Eisen, 1958, 78, Sept. 4, 1251-1262. £6 10s.

1156: "Creep Tests in Multi-specimen Machines at Temperatures Over 500 deg. C." H. WIEGAND and H. REINER, Metall., 1957, 11, May, 357-61 (Part I); 1958, 12, Sept., 803-10 (Part II). £7.

1398: "The Activation Energy of the Process of Diffusion Creep in Disordered Substitutional Solid Solutions of Metals. YA. E. GEGUZIN. Doklady, A. N., 1958, 120 (4), 819-822. £2 15s.

1515: "Summary of the Results of Joint Long-time Creep Tests: Conclusions for Steam-plant Construction." W. RUTTMANN and R. SHINN. VGB Mitt., 1958 (57), Dec., 411-20. £4 15s.

1748: "Creep and Rupture of Tubes Under Internal Pressure." S. N. KATS. Izv. Akad. Nauk. SSSR, Otd. Tekh. Nauk, 1957, Oct., 86-89. £2 5s.

BISITS translation of "Teoriya Polzuchesti i Dlitel Noi Prochnosti Metallov" ("The Theory of Creep and Long-time Strength of Metals"), by I. A. ODING, V. S. IVANOVA, V. V. BURDUKSKII, and V. N. GEMINOV, Moscow, Metallurgizdat, 1959, pp. 331-438. £6 10s. for each chapter, or £15 for all three. 1644. Part I, "The Ring Method of Testing Materials in Relaxation" (chapter 7, 331-367); Part II, "Stress Relaxation in Metals" (chapter 8, 368-412); Part III, "Relaxation and Creep" (chapter 9, 413-438).

New Electrode for Mild Steel

INTRODUCTION of the "Gazelle," a new Class E.217 mild-steel welding electrode, is announced by Associated Electrical Industries, Limited. The new electrode represents an addition to the range formerly known as Metrovick electrodes (with names "Sylvick," "Castivick," etc.).

The "Gazelle" has been developed to obtain smooth and speedy welding; features are high travel speeds, longer runs per electrode than with standard Class 2 electrodes, and a combination of characteristics that ensure high-quality welds with maximum ease of operation. Of the non iron-powder, contact type, the "Gazelle" is capable of satisfactory operation over very wide current ranges; for example, the current range for a four-gauge is 190/350 amp.

Operation is similar to that of iron-powder contact type electrodes, with an added advantage of negligible spatter, and deslagging properties are unequalled in the Class 2 range.

DEMONSTRATION OF NEW AEI "GAZELLE" WELDING ELECTRODE.

"Gazelle" electrodes are approved by Lloyds and the Ministry of Transport, and are available for test purposes or for normal demands.

INDIAN IRON-ORE MINES MECHANIZED

IRON-ORE mines at Rajhara in India have been fully mechanized to supply 7,000 tons of iron ore daily to the Bhilai steelworks, which will require about 2,000,000 tons of iron ore annually. Situated 55 miles from the steel plant, the Rajhara ore deposits are estimated at 114,000,000 tons. These are spread over a length of about four miles up to a height of 1,920 ft. and provide one of the best varieties of ores, with iron content ranging from 65 to 69 per cent.

Equipment for the mechanization of the Rajhara mines, weighing about 2,700 tons, which was received from the USSR, has been installed.

MINING MACHINERY MAKERS' "OPEN DAY"

New Equipment at Chesterfield

SOME of the products currently being manufactured by Markham & Company, Limited, Chesterfield (a subsidiary of John Brown & Company, Limited), were demonstrated at a recent "open day." The factory covers approximately six acres and is equipped with heavy and medium-sized tools, lifting facilities, and erection pits suitable for the manufacture of some of the largest mechanical and fabricated engineering products.

Markham & Company has specialized for many years in the design and manufacture of colliery equipment, and for the past 30 years, in collaboration with Boving & Company, Limited, London, W.C.2, in the manufacture of all types of water turbine and other equipment for hydro-electric schemes in most parts of the world. In addition, steelworks plant and rolling mill eqiupment have been made for many years, and a feature of the company's business has been the manufacture of special-purpose mechanical and other equipment to customers' individual requirements.

Winding Engines

More than 200 steam and electric colliery winding engines, ranging from 500 to 5,000 h.p., have been made and installed in this country and oversea. A project recently completed is that of the design and manufacture of the surface machinery, including friction winders, mine-car circulation systems, cages, and shaft equipment for the National Coal Board at Rothes Colliery (Fife).

Two of the largest four-rope friction winders made, with a drum diameter of 16 ft. and working to a final depth of almost 4,000 ft., with a winding capacity of 450 ton/hr., have been manufactured and recently installed at Wolstanton Colliery in the West Midlands Division of the NCB.

Other electric winders are in the course of manufacture (Fig. 1) for the programme of construction at several of the largest collieries in the country. During the visit a 50-ft. vertical lathe was seen turning a cast-steel conical drum to replace the existing one at Michael Colliery, No. 7 Area, Scottish Divisional Coal Board. The drum, with a minimum diameter of 15 ft. and a maximum of 20 ft., and formed from eight cast-steel sections, is scheduled for installation in July. Equipped for a 2¼-in. rope, the winding engine lifts a load of 40 tons from the shaft bottom.

A 20-ft. dia. parallel winding drum was also under construction for Shireoaks Colliery in the North-Eastern Division of the NCB. The weight of this drum and shaft is 90 tons, and the winding engine is designed to lift 400 tons of coal per hour from a depth of 1,650 ft. at a maximum speed of 38.4 ft./sec.

A hydraulic disc braking system for winding engines has also been developed and is undergoing tests. It is envisaged that multidisc braking will be established for large winding engines.

Typical underground machinery produced includes pneumatic stowing machines of various types and the necessary ancillary equipment for handling pit tubs and mine cars, plant for preparing waste rock to suitable dimensions, and pipeline items.

Water turbines of Boving design and Markham manufacture are to be found in some of the world's

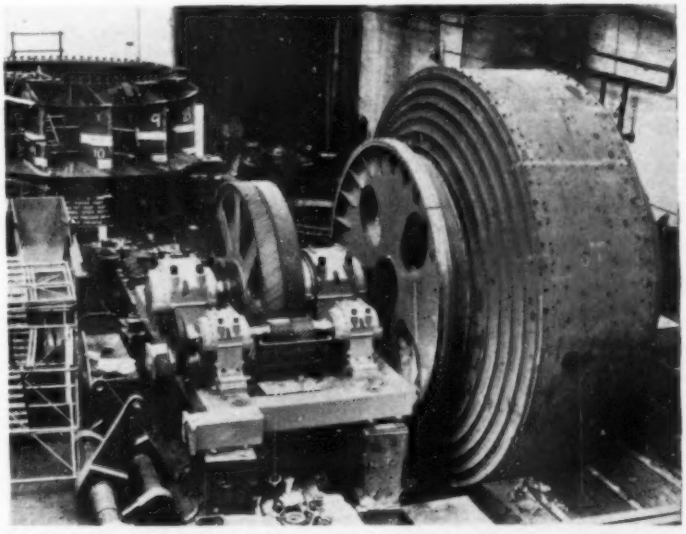


FIG. 1.—A LARGE WINDING ENGINE DURING WORKS ERECTION AT CHESTERFIELD.

largest hydro-electric schemes. An outstanding example is the Kariba scheme in Northern Rhodesia, where six turbines, each of 140,000 b.h.p. capacity at 167 r.p.m. and a head of 282 ft., comprising the first stage of the development, have recently been completed and delivered. Each of these turbines weighs more than 400 tons and each incorporates a spiral casing of welded construction with an inlet diameter of 14 ft. 6 in., and passes water at the rate of 9,000 ton/min. The stay ring, weighing 70 tons, and the runner, weighing 40 tons, are manufactured by the welding together of mild steel and 13 per cent. chromium stainless steel castings. This procedure called for a special welding technique.

The works is currently engaged in the manufacture of three turbines, each developing 105,000 h.p., for delivery to Spain, three turbines of 42,000 h.p. each for New Zealand, two turbines of 42,000 h.p. for Australia, and five turbines each of 82,500 h.p. for Tasmania. Nearing completion is a 17,000-h.p. unit for a Central Electricity Generating Board installation in Wales.

In collaboration with its associated company, the special engineering and nuclear division of John Brown & Company, the field of nuclear engineering has been entered with the design, manufacture, and installation later this year of a refuelling machine for the advanced gas-cooled reactor project of the UK Atomic Energy Authority at Windscale (Cumberland). This unique machine, which is 60 ft. high and weighs 400 tons, wil be used for charging and discharging the reactor. Since the charging and discharging of the fuel elements must be carried out under full load conditions, special mechanical and electrical controls, including television equipment, will be installed to ensure ease of operation and maximum safety.

Following the recent agreement made between Demag A.G., Duisburg, Germany, and John Brown (S.E.N.D.), Limited, Markham & Company is manufacturing a large part of the new wide-flange beam mill for the South Durham Steel & Iron Company, Limited.

Tunnelling shields, air locks, and other plant for the driving of tunnels in types of soil where these techniques are appropriate, are also among Markham's specialities. Notable examples include the Mersey tunnel, the Dartford-Purfleet tunnel, the Moscow underground railway, and most of the Underground railway tunnels in London. This equipment has also been used for tunnelling schemes in France, Italy, and the West Indies.

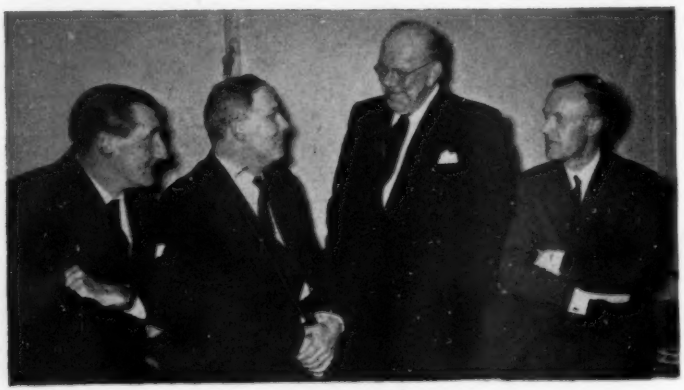
High-purity Mercury

Following the installation of new equipment, Johnson, Matthey & Company, Limited, 73-83, Hatton Garden, London, E.C.1, is now able to offer in quantity two grades of mercury for laboratory and industrial use. Redistilled mercury has a maximum impurity content of 5 parts per million (costly copper and silver) and triple-distilled mercury a maximum of 1 part per million. The metal is supplied in 7, 14, or 28-lb. containers, though other packings can be provided. The product is described in a newly issued data sheet in the Electrical Engineering series, 1300:492, available from the company.

IPE Meeting at Olympia

The Institution of Production Engineers' 1960 George Bray Memorial Lecture will be given by Mr. H. Silman, his subject being "The Protective Treatment of Metals Against Corrosion." A past president of the Institute of Metal Finishing, Mr. Silman is a director of the Electro-Chemical Engineering Company, Limited. The lecture will be given in the Pillar Hall at Olympia, London, at 4.15 p.m. on April 26, the day of the institution's official visit to the Engineering, Marine, Welding, and Nuclear Energy Exhibition. Admission to the lecture will be by ticket only, the tickets also admitting to the exhibition on that day.

SOUTH MIDLAND BRANCH, NACM



FIRST buffet/dance organized by the South Midland Branch of the National Association of Colliery Managers was held at the Mines Rescue Station, Ashby-de-la-Zouch, on March 17.

It proved to be a highly enjoyable and successful evening.

The photograph shows (left to right):—Mr. H. B. Bennett (past president); Mr. L. J. Mills (president elect); Mr. S. A. McKee (past president and branch representative on the national council), and Mr. T. W. Peters (president of the branch).

New Literature

CATALOGUES, house magazines, booklets, and other publications received include those referred to below. IRON AND COAL readers wishing to obtain a copy of any of the items are invited to write to the address given, at the same time mentioning this journal.

BELMOS COMPANY, LIMITED, Bellshill (Lanarkshire)—Leaflet F210 describes the company's new type DS3 contactor starter.

JOHNSON, MATTHEY & COMPANY, LIMITED, 73-83, Hatton Garden, London, E.C.1—A new edition of the company's booklet No. 1760, "Spectrographically Standardized Substances," has been issued.

INDUSTRIAL WELFARE SOCIETY, Robert Hyde House, 48, Bryanston Square, London, W.1—The ninth edition of the annual magazine Foreman, designed to improve the man and the job, is now available (3s., post free). Accident prevention, factory fire dangers, and many other subjects are covered.

GEORGE COHEN 600 GROUP, LIMITED, 600, Wood Lane, London, W.12—Four times every year, with the arrival of a new season, we welcome a new issue of the 600 Magazine. The spring number, now available, contains the familiar range of articles, serious and much less serious, and a host of photographs and cartoons.

JOSEPH RHODES & SONS, LIMITED, Belle Vue, Wakefield (Yorks)—Two new technical publications deal with part of the company's range of fluid-driven shears. They are "Hydraversal Shears" (which has the challenging claim that it "does the work of five machines; costs less than one" on the cover) and "Fluid Drive Shears."

WILD-BARFIELD ELECTRIC FURNACES, LIMITED, Elecfurn Works, Otterspool Way, Watford By-Pass, Watford (Herts)—Two replacement catalogues have been issued. VW1260 (replacing VW856) deals with the vertical general-purpose furnace and HW1260 (replacing HW356) is concerned with the horizontal general-purpose furnace.

RANSOMES & RAPIER, LIMITED, Waterside Works, Ipswich—The RapieR 511 mobile crane is the subject of an excellent new catalogue. "Robust and reliable in design, the 511 features high-speed operation, exceptional manoeuvrability, smooth travelling and effortless steering with a very small turning circle, and easy maintenance," we are told. The publication goes on to give the fullest details of the 511.

VICTOR PRODUCTS (WALLSEND), LIMITED, Wallsend-on-Tyne—Reorganization being undertaken in the company's selling methods is explained by the managing director, Mr. R. W. Mann, in his review in the March issue of the Victor Magazine. Mr. L. R. Mann, the chief engineer, contributes an article on "Temperature Measurement," while other articles and features make this a very readable little publication.

REINFORCED CONCRETE ASSOCIATION, York Mansion, 94-98, Petty France, London, S.W.1—Savings estimated at 5 to 10 per cent. of the total building cost, construction times of a storey a week or better, suitability for buildings of up to 500 ft. in height at the least, the highest fire resistance and the lowest maintenance costs. These are some of the advantages of reinforced concrete presented in a brochure entitled "Structural Achievement in Concrete." A leaflet on the aims and constitution of the association is included in the publication.

SOUTH AFRICAN IRON & STEEL INDUSTRIAL CORPORATION, LIMITED, P.O. Box 450, Pretoria—The February issue of Iscor News arrived at a time when, due to the policy of the South African Government, that country was very much in the news. The Iscor organization is always to the forefront of South African industrial news and the monthly magazine invariably tells an interesting story of developments. But only some of it is printed in a language we are able to understand.

NATIONAL SOCIETY FOR CLEAN AIR, Field House, Breams Buildings, London, E.C.4—That boiler firemen or stokers, should have to be qualified as an aid to smoke prevention is a proposal put forward by the society. In the spring issue of its journal Smokeless Air (2s.) is published a draft Bill, which, if enacted, would require all furnace and boiler operators to possess a certificate of competency. The society is not at present, seeking to have such a Bill introduced in Parliament, but is trying to promote discussion and support.

UNION CARBIDE, LIMITED, 8, Grafton Street, London, W.1—The March issue of Alloys and Metals Review is the second of a new series of occasional publications to be issued by the company. The excellence of the magazine leads one to express the hope that its future appearances will not be too occasional. Included in the current number is a description of the organization of the company's alloys division. Mr. H. P. Rassbach, manager of metallurgical service, Union Carbide Metals Company, USA, reports on his recent trip to Europe, while Mr. George Krois, of the Union Carbide International Company, describes how the use of bulk oxygen in steelmaking is being developed in the USA to produce high-purity steels more quickly and, in certain conditions, more cheaply, than other methods. Metallurgical people will find plenty more of interest in this publication.

Production Technology Course

A FULL-TIME intensive course on production technology will open at the Borough Polytechnic on May 1. The entry qualification for the course, which is of eight weeks' duration, is B.Sc.(Eng.) degree or equivalent with a minimum age of 20.

The course will provide practical and theoretical training in production technology for graduate trainees and include basic training practical processes. It will enable graduates to supplement their academic and works training and so obtain an understanding of practical engineering production more rapidly. Full details may be obtained from the Secretary, Borough Polytechnic, Borough Road, London, S.E.1.

Mawco Cutter Loader

In Mr. N. Siddall's paper on the "Development of the Mawco Cutter Loader," published in our March 24 issue, the estimated chain cost was shown, on page 628, as 6s. 8d. per ton. This was, of course, an error and should have been 6.8d. per ton.

New Equipment and Products

"Green Seal" V-Belts

LONGER life, coupled with higher efficiency, the need for fewer belts and lighter pulleys on the same job, is now possible with the introduction of a new range of V-belts with higher horsepower ratings, announced by the Goodyear Tyre & Rubber Company (Great Britain), Limited, Wolverhampton. Known as the "Green Seal" range, these belts last longer because of modern construction methods and materials, and incorporate the qualities of other Goodyear V-belts, which are non-slip, cool running, and resilient, giving the utmost reliability with less risk of costly shutdowns.

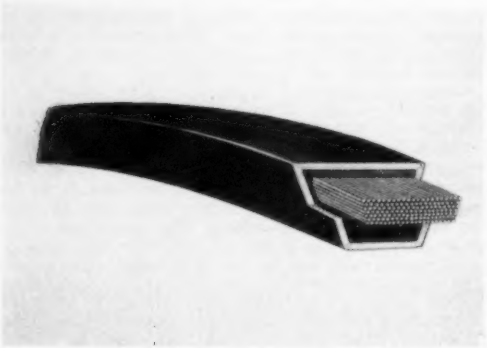


FIG. 1.—THE GOODYEAR "GREEN SEAL" V-BELT.

The two new belts are the "Green Seal" EC Red V-belt, dimensionally stable under all stocking conditions, with a 40 per cent. higher horsepower rating than the old standard EC V-belts at no extra cost, and the "Green Seal" HY-T Premium V-belt, having a 100 per cent. higher horsepower rating than the old EC V-belt at 25 per cent. extra cost. This latter belt is also static conducting, oil-resisting, and dimensionally stable under all stocking conditions.

Electronically Controlled Weighing

CONTROL weighing equipment recently marketed by Electroweighers (Birmingham), Limited, Moseley Street, Birmingham 12, can be used in any situation where mixing and blending are required, while special designs are available to meet specific requirements. The equipment functions in the following manner. Material A is weighed on an electronic continuous belt weigher. Signals from the weigher control unit are fed to an electronic sampler and memory unit. The delayed signals from the memory unit are then used to control the excitation of a vibratory feeder, which supplies the required amount of material B onto another conveyor, which carries both materials.

The belt-weighing equipment comprises an electronic control unit and a weighbridge incorporating a linear inductive load cell which weighs material A. Voltage signals dependent on load are fed to a memory and sampler unit which registers average load and retains the signal for the requisite time period (up to 45 sec.) before operating a serve motor driven-toroidal transformer, the voltage output of which supplies variable excitation to the vibrator feeder, which, in turn, varies the flow of material B.

Emergency Stop for Conveyors

IMMEDIATELY operative whenever an operator passes his hand over a conveyor at any point between its ends is an emergency device now being manufactured and marketed by Hird-Brown, Limited, 244, Marsland Road, Sale (Ches). It is operated by a beam of light and a photo-electric cell, and cuts to an absolute minimum the time between an emergency being detected by the operator and stoppage of the conveyor, this increasing operator and plant safety. The unit has also been arranged to fail safe so that component failure will stop the conveyor.

The device is simple to install and in single units can be used with ray lengths of up to 75 ft., although longer lengths can be accommodated by overlapping units. The ray of light can be positioned in the place most suitable depending on site conditions and, of course, it is applicable to machinery other than conveyors. If necessary, the equipment can be supplied in flameproof certified housings.

Pneumatically Operated Bin Outlet

DESIGNED for the control of heavy materials from bins and hoppers, a new type of pneumatically-operated bin outlet has been produced by Lindars Automation, Limited, 143, Maple Road, Surbiton (Surrey). It is in the form of a heavy-duty clamshell shutter gate, which, while allowing a free flow to the material being discharged, has a positive action when closing which completely cuts off the material without the risk of jamming, even when handling large-sized pieces of irregular shape.

It is of robust construction in mild steel and all the operating mechanism is protected from dust and from contact with the material being handled, as it is placed outside the shutter-gate body. This arrangement further ensures that all parts requiring maintenance are readily accessible. The valves may be worked electrically or manually and a series of shutter gates can be arranged for automatic operation by remote control, if necessary in a given sequence.

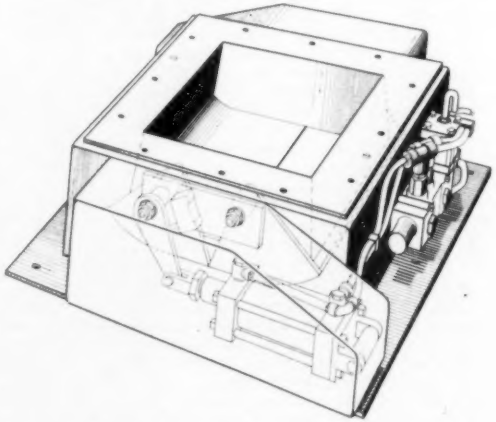


FIG. 2.—THE HEAVY DUTY CLAMSHELL SHUTTER GATE.

Sealing strips to prevent air leakage can be fitted as an optional extra.

Six standard sizes are available with openings ranging from 4½ in. by 4½ in. to 18 in. by 18 in.

Heat-resistant Conveyor Belting

RECENTLY developed by the Goodyear Tyre & Rubber Company (Great Britain), Limited, Wolverhampton, is the Terylene reinforced Thermo-Flo heat-resistant conveyor belting (Spec. 272 and 124), which is a premium-grade hot materials conveyor belt similar to the cotton reinforced Thermo-Flo conveyor belt. The belt is available with two types of carcass reinforcement—TD.90, which will rate at 90 lb./ply in. for vulcanized joints and 50 lb./ply in. for mechanical fasteners, and TD.112, which will rate at 112 lb./ply in. for vulcanized joints and 54 lb./ply in. for mechanical fasteners. The belt is available in widths and plies as required for the various conditions of service.

Thermo-Flo Terylene will handle hot, fine slumping materials and is specially suitable for the higher temperatures up to 400 deg. F. where the superior heat resistance of Terylene over cotton will help prolong belt life at these elevated temperatures. Thermo-Flo Terylene can be made endless by vulcanized joints either in the factory or on site by the company's mobile field splicing service.

Gear Unit for Wrench-operated Valves

A NEW light-duty gear unit for use with certain wrench-operated Audco valves, has recently been designed. The unit can easily be fitted to existing valves already in service or it can be supplied assembled on a new valve. It consists of a cast-iron quadrant which is clamped to the plug stem of the valve (Fig. 3). Meshing with the quadrant is an Audcology pinion which is mounted on a stub shaft attached to the valve. Internal teeth have been used both to give correct rotation of the valve-clockwise closing and also to afford protection to the gear and operator. No lubrication is needed on the gear, a better performance being obtained when dry.

The new equipment is not intended for use as a substitute for existing worm gear units, but to offer an inexpensive mechanical means of operating certain larger wrench-operated Audco valves with a minimum of effort.

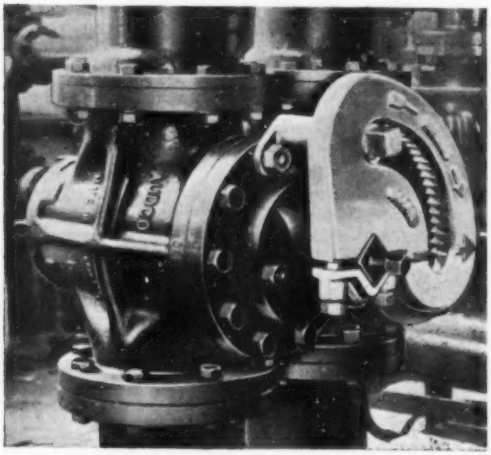


FIG. 3.—THE "AUDCO" GEAR UNIT FOR WRENCH-OPERATED VALVES.

Propane Heating for Steel Ladles

BY a new heating device using propane, preheating and drying of 60- to 80-ton pouring ladles at the Bynea Steelworks, Limited, Loughor (Carmarthenshire), has been simplified and accelerated. Specially developed by the British Oxygen Company, Limited, the heater (Fig. 4) is a portable air-induced propane burner which is put in the ladle to get rid of moisture after rebricking and to prevent the molten steel chilling when it is poured into the ladle.

FIG. 4.—PROPANE HEATING OF STEEL LADLES.

With the new method the heating process takes about 2 hr. compared with about 8 hr. using a coal fire inside the ladle. The new technique, besides being quicker and cheaper, does away with ladle cleansing and needs little or no supervision. At Bynea Steelworks propane is drawn from a 5-ton bulk supply tank installed by B.O.C. Through 5,000 ft. of pipeline it serves systems for ladle heating, deseaming, scrap-cutting, general cutting, and maintenance.

"Noble Metal Thermocouples"

A third edition of H. E. Bennett's "Noble Metal Thermocouples" has been published by Johnson, Matthey & Company, Limited, 73-83, Hatton Garden, London, E.C.1. The book describes the development of the noble metal thermocouple, its applications in steelworks, foundries, and glassworks, and methods of calibration. Curves of temperature against e.m.f. are given for many types of couple incorporating alloys of the platinum group metals, and a chapter describes the chief causes of deterioration in service. A new feature of the present edition is a short section summarizing the behaviour of the many thermocouple combinations that have been proposed from time to time, and recommending those most suitable for particular applications. The book is available without charge.

CORRESPONDENCE

To the Editor of IRON AND COAL

"SHINY OLD IRON"

SIR,—A reference in your issue for March 10 ("Shiny Old Iron," p. 502) to the cache of 7 tons of Roman nails, found recently in Perthshire by Prof. Richmond, prompts me to inform you that in the group laboratories of the English Steel Corporation, Limited, we have already had an opportunity of examining samples of these nails, through the interest of the owner of the property on which they were found.

FIG. 1. ×1

The first sample to be received (Fig. 1, full size) did show surprisingly little rusting considering that the nail had been buried for almost 1,900 years. The squareness of the section was notable, and it was evident that the nail had been made from hammered bar of square section. One end had been pointed and the other had been upset to form a flat head. The sample still carried the original planished forging scale, in this instance about twenty thousandths of an inch in thickness, which had served to protect the iron beneath. It is the appearance of this scale which has been the cause of such misleading statements as "shiny old iron" and "the nails are as bright as the day they were made."

Chemical analysis revealed the elements normally found in wrought iron, and under the microscope the usual inclusions of slag were seen. For the most part, the microstructure consisted of almost carbonless ferrite; but this sample did include small areas of relatively high carbon, estimated at over 1 per cent., which indicated incomplete refinement of the iron during smelting. I suppose that these areas were similar in composition and microstructure to early Wootz-iron, from which the famous Damascene swords were made.

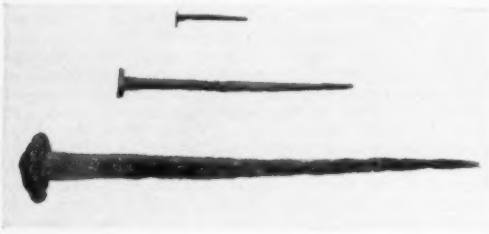


FIG. 2. ×½

Further samples, varying in length from two to 12 in., were also received (Fig. 2, half-size), but these were not so well preserved, and the opinion was formed that the rusting of the nails on the outside of the cache had sealed and protected those within.

It is hoped that this short account of what has been found in these laboratories will help to dispose of the idea that ancient iron possesses some inherent property which delays or prevents the onset of corrosion. It can be seen from these and other photographs which have been published that these iron nails of long ago had rusted.—Yours faithfully,

J. H. SLAGG,
Senior metallographist.

English Steel Corporation, Limited,
River Don Works,
Sheffield 9.
March 22, 1961.

Standard Engineers' Conference

SEVENTH annual conference of engineers and others concerned with the application of standards is being held on May 9 and 10 and will be opened by Lord Hailsham, Lord President of the Council and Minister for Science. These conferences have attracted increasing interest over the past years and have provided a valuable opportunity for discussion and exchange of experience among standards personnel from a growing range of industries. It has been decided this year to hold a two-day meeting, with parallel sessions on the second day, to give greater opportunity for detailed discussions.

The first day of the conference will consist of plenary sessions at the Connaught Rooms, Great Queen Street, London, W.C.2, when Sir Stanley Harley (Coventry Gauge & Tool Company, Limited) will take the chair. After the formal opening by Lord Hailsham, a contribution on the trades union viewpoint on industrial standards will be given by Mr. G. Doughty (Association of Engineering and Shipbuilding Draughtsmen). Papers will also be given on "An Integrated Standards Programme in the Company" (by Mr. F. E. Butcher, of Joseph Lucas, Limited), "Standards in Products Development (Electronics)" (by Mr. D. F. Egan, of Mullard, Limited), and "Standards in Market Research and Sales" (speaker to be announced).

The second day's programme, to be held at British Standards House, 2, Park Street, London, W.1, will consist of three parallel sessions in the morning and three in the afternoon, to discuss in smaller groups various topics, including:—"The Application of a Standards System in a Smaller Company;" "Steel—Variety Reduction by Manufacturers and Users;" "Standardization in Fields where Techniques are Advancing Rapidly," and "The Unified Screw Thread in British Industry."

NEW *"Lorry Loader"* CRANE

A NEW version of the "Lorry Loader" crane has been introduced by R. H. Neal & Company, Limited, Grantham. This type of crane is fitted to standard commercial vehicles to provide independent cranage. A "Lorry Loader" crane by providing independent handling facilities for loading and off-loading, offers cost-cutting advantages to the transport operator, it is claimed. Vehicle turnround time is greatly reduced and, because the equipment can be operated by the driver, labour and handling costs are at a minimum.

The new Mark II model is similar to the original Mark I "Lorry Loader," but offers features which increase its scope and utility. Most important of these is the articulating jib operated by a double-acting hydraulic ram. This gives much greater flexibility and accuracy in the handling of loads to or from the vehicle.

THE NEAL MARK II "LORRY LOADER" CRANE IN ACTION. CLEARLY ILLUSTRATED ARE THE HYDRAULICALLY OPERATED JIB ARTICULATION AND HYDRAULIC SUPPORT LEG.

Another feature which speeds operation of the crane is the ability to operate all motions of slewing, derricking, and jib articulation either independently or simultaneously.

Light but rigid construction is achieved in the Mark II "Lorry Loader" by the use of fabricated steel pressings and seamless tubes. The pressed steel jib has an articulating action operated by a double acting hydraulic ram and an additional manual telescopic extension provides a maximum outreach of 11 ft. 2 in.

An oil pump fitted to the vehicle gearbox power-take-off provides power for the crane. Operation is by three hydraulic control levers which may be operated either independently or simultaneously.

The usual mounting position is on the left hand side of the vehicle, the chassis being suitably reinforced by mounting plates and cross bracing. A hydraulic support leg is also provided to relieve the chassis and springs when handling loads. Maximum lifting capacity of the "Lorry Loader" is 1 ton at a radius of 5 ft. 5 in., which is reduced to 7 cwt. at the maximum radius of 11 ft. 2 in.

Provision is made for variation in the height of cabs of differing manufacture. A short or long crane pillar can be provided depending upon requirements.

The space required between the body and driver's cab is 14 in. to 17 in.

CREEP DATA:

MERL Information Centre

THE Creep Information Centre has been established by the Mechanical Engineering Research Laboratory at the National Engineering Laboratory so that data on the strength of materials for use at elevated temperatures can readily be made available to designers from one source.

The centre has been set up in response to requests from manufacturers and users of high-temperature materials.

Creep and rupture properties of conventional high-temperature materials are now being collected and tabulated, and some British manufacturers have already sent details of their standard materials to the centre. In due course, high-temperature data for British materials will be issued in an agreed form, although commercial security may restrict publication of some of the data.

Eventually it is hoped to extend the scheme to cover information about foreign materials and equipment.

Further information is given in C.I.C. Note No. 1, available from the Mechanical Engineering Research Laboratory, East Kilbride, Glasgow.

Forthcoming Events

APRIL 10

Society of Engineers:—Meeting at the Geological Society, Burlington House, Piccadilly, London, W.1, at 5.30 p.m. "Use of Electric Light and Heat in Horticulture," by A. E. Canham.

Society of Instrument Technology (Manchester Section):—Meeting at the Nag's Head, Jacksons Row, Manchester, at 6.45 p.m. "Industrial Application of TV."

Institute of British Foundrymen (Sheffield Branch):—Meeting at the Technical College, Pond Street, Sheffield, at 7 p.m. "Cost Control in the Foundry," by D. A. Crooks.

Institute of Marine Engineers (West of England Section):—Meeting in the Small Engineering Lecture Theatre, University of Bristol, University Walk, Bristol 8, at 7.30 p.m. "Details and Operating Data of Recent a.c. Installations," by A. N. Savage.

Institute of Marine Engineers (Merseyside and North Western Section):—Meeting at the Liverpool Engineering Society, The Temple, Dale Street, Liverpool, at 6 p.m. "Materials for Advanced Steam Conditions and their Influence on Operation of Turbines and Boilers," by Cdr. H. E. C. Hims and S. H. Frederick.

APRIL 11

Combustion Engineering Association (Northern Region):—Meeting at the George Hotel, Huddersfield, at 2.30 p.m. Papers on "Operation and Incentive Schemes Applied to Shell Boiler Installations."

Institution of Chemical Engineers:—Joint meeting with the Chemical Engineering Group at the Society of Chemical Industry, 14, Belgrave Square, London, S.W.1, at 6 p.m. "A Systematic Classification of Chemical Processes and Equipment," by K. Fischbeck.

Institution of Engineers and Shipbuilders in Scotland:—Annual general meeting at 39, Elmbank Crescent, Glasgow, C.2, at 6.30 p.m., followed by "Cavitation Tunnel Tests with Merchant Ship Propellers," by H. B. Lindgren.

Institution of Plant Engineers (Manchester Branch):—Meeting at the Manchester Literary and Philosophical Society's Rooms, George Street, Piccadilly, Manchester, at 7.15 p.m. "Welding," by Dr. F. Koenigsberger.

APRIL 12

Iron and Steel Institute:—Joint meeting with the Sheffield Metallurgical Association and the Sheffield Society of Engineers and Metallurgists at the Engineering Lecture Theatre, The University, St. George's Square, Sheffield 1, at 2.15 p.m.

North Western Fuel Luncheon Club:—Meeting at the Engineers' Club, 17, Albert Square, Manchester 2, at 12.15 p.m. "Primary Fuels for Electricity Generation," by F. H. S. Brown, deputy chairman, Central Electricity Generating Board.

Institution of Chemical Engineers:—One-day symposium at the Chemical Engineering Department, University of Birmingham, Edgbaston, Birmingham 15, at 9.30 a.m. Morning session: "New Metals and Alloys as Materials of Construction." Afternoon session: "New Non-metallic Materials of Construction."

Institution of Plant Engineers (East Midlands Branch):—Meeting at the County Hotel, Theatre Square, Nottingham, at 7 p.m. Members' 10-minute papers.

Institution of Plant Engineers (Western Branch):—Meeting at the Grand Hotel, Broad Street, Bristol, at 7.15 p.m. "Electricity Supply and Distribution in Factories," by C. H. J. Bax.

Institution of Production Engineers (Nottingham Section):—Visit to Yorkshire Imperial Metals, Limited, Stourton, near Leeds.

Institution of Production Engineers (Liverpool Section):—Meeting at the Exchange Hotel, Tithebarn Street, Liverpool 1, at 7.30 p.m. "New Materials in Industry—Plastics," by E. M. Elliott.

Institution of Production Engineers (South Essex Section):—Meeting at Ilford Conservative Club, 42, High Road, Ilford, at 7.30 p.m. "Chemical and Electrolytic Surface Finishes," by D. Read.

APRIL 13

Institution of Plant Engineers (Glasgow Branch):—Meeting at the Scottish Building Centre, 425, Sauchiehall Street, Glasgow, C.2, at 7.15 p.m. "Plant Records"; a consortium of committee members will present data on their established systems.

Institution of Plant Engineers (North East Branch):—Meeting at Roadway House, Oxford Street, Newcastle-upon-Tyne, 1, at 7 p.m. "Modern Welding Processes," by J. A. Lucey (Quasi-Arc, Limited).

Institution of Electrical Engineers (West Wales (Swansea) Sub-centre):—Meeting at the South Wales Electricity Board, The Kingsway, Swansea, at 6 p.m. "The Determination of the Electrical Characteristics of an Arc Furnace," by J. Ravenscroft.

Institution of Mechanical Engineers:—Joint meeting with the Institution of Electrical Engineers and the Institution of Civil Engineers at the ICE, Great George Street, London, S.W.1, at 5.30 p.m. Seventh Graham Clark Lecture by the Duke of Edinburgh.

APRIL 14

Lincolnshire Iron and Steel Institute:—Annual dinner.

West of Scotland Iron and Steel Institute:—Annual general meeting at 39, Elmbank Crescent, Glasgow, C.2, at 6.45 p.m., followed by "Heating and Oxidation in the Basic Open-hearth Process," by I. M. Mackenzie, D. Hadfield, T. Urie, and Mrs. A. Donald.

APRIL 17

Society of Instrument Technology (Bristol Section):—Annual general meeting, followed by film show, at the University of Bristol, Department of Physics, The Royal Fort, Bristol 8, at 7.30 p.m.

APRIL 19

Institute of Fuel:—Annual luncheon at the Connaught Rooms, Great Queen Street, London, W.C.2, at 1 p.m. (reception 12.30 p.m.). Principal guest and speaker: Sir Julian Pode, managing director, Steel Company of Wales, Limited.

APRIL 20—MAY 4

Engineering, Marine, Welding and Nuclear Energy Exhibition:—Olympia, London, W.14.

APRIL 21

Wigan and District Mining and Technical College (Past and Present Mining Students' Association):—Annual general meeting in the board room of the college at 5 p.m.

National Association of Colliery Managers

APRIL 11

Yorkshire Branch:—Annual general meeting at the Miners' Welfare Hall, Brodsworth, at 3 p.m.

APRIL 17

Midland Branch:—Meeting at the Five Ways Hotel, Nottingham, at 6.30 p.m. Address by H. S. Stephenson, HM Divisional Inspector of Mines.

APRIL 21

Kent Branch:—Annual general meeting at the Swan Hotel, Deal, at 7.15 p.m., followed by "The Reconstruction of Snowdown Colliery," by J. L. Huxley, agent/manager, Snowdown Colliery.

APRIL 26

Lancashire Branch:—Meeting at 40, Portland Street, Manchester. "The Application of Fluid Drives in the Mining Industry," by E. C. Farrer, director, Fluidrive Engineering Company, Limited.

APRIL 27

South Staffordshire, Warwickshire, Worcestershire and Shropshire Branch:—Visit to Bretby Central Engineering Establishment.

APRIL 28

Kent Branch:—Annual dinner and dance at the County Hotel, Canterbury.

"Mechanization in South Wales"

In connection with his paper, "Mechanization in South Wales," published in our March 17 issue, the author, Mr. G. V. Standerline, writes: "I would like to correct the caption of Fig. 4. This should read 'Intermediate Return Unit' and not 'Hooked Return Unit' as printed."

Pits Mechanization Drive

22,000,000 TONS A YEAR MORE BY POWER-LOADING

MAJOR effort to increase productivity in the coal mines is being made this year by the National Coal Board, which aims to reduce working costs by mechanizing the coal-getting process at a higher rate than ever before, and to improve the production of coal by more efficient methods. The board intends to raise the power-loaded percentage of coal by 10 points—from 38 to 48 per cent. of saleable output. Up to 400 new machines are to be installed with the aim of increasing the power-loaded output by 22,000,000 tons.

Leading the drive for more mechanized coal getting will be three machines—the Anderton shearer loader, the trepanner and the coal plough—which between them accounted for 63 per cent. of the power-loaded total in 1960.

The Anderton shearer, states the board, has proved itself to be a most efficient and reliable machine which can be used in the widest range of mining conditions, but because of the need to increase the production of large coal, the emphasis this year will be on installing more ploughs and trepanners.

Concentrating Production

The rise in productivity has been one of the main features of the coal industry's progress in recent years. The output per shift worked at the coal face, and that for all men employed in the pits is running at record levels. Mechanization at the coal face has made the most significant contribution to the recent advances in output per manshift. It has been accompanied by allied improvements in roof support, by the increased use of conveying and locomotive haulage, by the more careful deployment of manpower, and to some extent by the closure of old collieries. More recently, greater attention has been given to concentrating production in places where more effective results can be obtained.

The power-loading of coal made little progress in this country until machines suitable for British mining conditions started to be developed a little more than 10 years ago. In 1950 only 3.8 per cent. of the total tonnage was won entirely by machine. Progress since then has been rapid and in 1960 the proportion mined in this way was 38.2 per cent. Last year about 83,000,000 tons of raw coal were so mined and sent to the surface for cleaning.

Last year the percentage of power-loaded coal rose by six points—from 32 to 38 per cent. Miners on mechanized faces were getting 115 cwt. on each shift, while those on conventional faces were producing 72 cwt., and there was a general improvement on all coalfaces of 4½ cwt. a shift. This year the board intends to raise the power-loaded percentage from 38 to 48 per cent. of saleable output.

The success of the power-loading drive depends upon a number of factors. The cost of equipping a face for full mechanization may be between £50,000 and £100,000, and although face labour costs are less than in conventional mining, the machines must be used to their full capacity if an adequate return is to be gained from the capital and other investment they involve.

Much depends on the simultaneous delivery of such equipment as power-loaders, conveyors, roof supports, and such other items as switchgear. In addition to supplying the machines, manufacturers have to provide spare parts so that both new and existing installations can be kept going.

This large-scale operation, says the board, will not fail to meet the setbacks that are so often encountered in mining, but it will go forward side-by-side with greater concentration of production to obtain a better balance between the capacity of each coal face and the services that support it.

The aim of concentration is to get the highest possible tonnage from each working face. It is achieved by increasing the length of the most productive faces, by securing a bigger advance on each shift and by getting coal on two or possibly three shifts instead of the one which is normal in conventional working. Fewer coal faces mean a reduction in the number of connecting roadways and the cost of their maintenance, and longer faces offer a better return for the money spent on equipping them.

Coal Chartering

CHARTERING from the Hampton Roads has again been dominated by the volume of tonnage taken up on Japanese account and this particular section of the market is steady and inclined in owners' favour. Several vessels have been fixed to this area and $8.90 has been paid for 18,000 tons second half April, $8.60 for 11,000 tons May/June, $8.45 for 14,000 tons July, and a cargo of 4,500 tons for second half May shipment at $9.00. Roads/Chiba direct paid $8.60 for 23,000 tonner, April shipment. There are also reports of a large vessel having been fixed for consecutive voyages at $7.70. Demand continues, with interest in early and forward loadings.

There is also some demand to South America and recently $5.15 was paid for about 13,000 tons middle April shipment from the Roads to Rio de Janeiro. Here again, charterers are interested in further tonnage but nothing has recently been reported to the Lower Plate. There is possibly a little more interest on the part of Italian charterers, $4.05 being fixed to a 15,500 tonner from Hampton Roads to Savona for prompt loading, and a possibility of working tonnage for a few consecutive voyages to Italian Adriatic. Antwerp to West Italy paid 17s. for a 10,000 tonner, option second and third discharging ports at 18s. and 19s. respectively, for prompt shipment. There is a miscellaneous demand from the Continent, but as far as the Mediterranean is concerned rates do not improve.

The UK market generally is quiet, with some interest to the Mediterranean area, but there is still a reasonable demand for tonnage coastwise—including East Coast to Scandinavia.

Mr. A. F. Oatley's "Small Voice of Protest"

"EACH year in this statement I have added my very small protesting voice to the ever-increasing number who pray for an invigorating legislative 'Wind of Change' with the realization that present policy leads one way only—to increasing resentment, frustration, and with vicious penal taxation as a reward for success, cynical apathy." Mr. A. F. Oatley, chairman of Cannon (Holdings), Limited, concludes his annual statement with this lively "sting in the tail."

"Is it not true," he asks, "that because of the need to protect the home market, more and more manufacturers . . . are producing cheap and shoddy products—a resented but enforced policy in order to achieve the obvious sales advantage of 'low deposit' in their home market? This universally hated legislation has already set the pattern of a widening policy which is doing more harm abroad to the reputation of 'British Made' than any healthy normal competition could possibly do.

"Is it not ironical that the same people who have sired it are now bleating about the ugliness of the child for whose birth they are responsible?

"How can the Government continue to exhort the manufacturer to modernize and reduce costs by the installation of the latest plant, tools, and machinery if they then legislate the speed and stop and start of the production of the very products that have been installed to more economically produce? Under such conditions how in all honesty, can they continue to chant the patriotic need to promote more exports while maintaining this Fifth Column continually engaged in sabotaging the very effort they seek to encourage?"

Mr. Oatley joins with those who "fervently hope" that the Chancellor will at least make some effort to "start us back on the road to legislative sanity and so make it possible for the manufacturer to better promote the continuity of prosperity . . . without unreasonable petulant nagging."

A copy of the statement has been sent to the Chancellor with the covering commentary:—

Sir:

To you I send a message clear,
From others, too, who pray to hear
Pronouncements wise and just, to say,
This is Yours—this Budget Day.

The Labourer, worthy of his hire,
Expects from you the words that fire
Imagination and Desire—this Budget Day.

All praise to you for purpose bold,
To uplift "Have Nots" and protect the Old,
But once upon a time was told—
The Parable of the Talents.

CALLED RUSTYFA, a consortium of British companies, Mather & Platt, Limited, Simon Handling Engineers, Limited, Crompton Parkinson, Limited, David Bridge & Company, Limited, Francis Shaw & Company, Limited, and Lancashire Dynamo Holdings, Limited, has designed and produced the plant and machinery for the Russian tyre factory which is shortly to go into production at Dniepropetrovsk, in the Ukraine. The engineering plant is worth £14,000,000 and the 79-acre factory has been designed to produce 2,000,000 tyres a year. George W. King, Limited, supplied the mechanical handling and conveying plant, the last of which has now been despatched to Russia.

Midland Steelworks are Short of Scrap

DIRECTOR and commercial manager of Round Oak Steel Works, Limited, Brierley Hill (Staffs), Mr. Cox said last week in Birmingham, that concern was growing in Midland steelworks because of the heavy drain on stocks being forced upon them by the shortage of scrap. As a result of this shortage, he stated at the annual luncheon of the Midland Scrap Iron, Steel and Metals Association, steel firms were having to take increasingly large tonnages out of stocks week by week. Mr. Cox hoped that the start of summer time bringing longer hours of daylight working, would enable scrap merchants to rectify the shortage. "It will be serious indeed," he said, "if stocks continue to fall at their present rate."

Immediate attention also needed to be given to the alarming increase in the content of copper in steel scrap. Merchants in the scrap trade, as well as the actual producers, should ensure high standards in British quality steels. There was little scope for exports in scrap because all available supplies were needed at home.

Mr. J. D. Norton, president of the association, said a decline in the precision of scrap sorting was a inevitable result of the competition stemming from a booming market and heavy demands. In the long run, however, it was detrimental to both supplier and user.

Plan to Feed Steel Furnaces Direct from Rail Wagons

WORK-STUDY engineers and operational research techniques are being used to plan an apparatus which will feed scrap by direct tipping from rail wagons via a "basket" holding 60-70 tons of scrap into the giant 100-ton electric furnaces of the new steelworks, which the English Steel Corporation, Limited, a subsidiary of the Vickers, Limited, group, is building at Tinsley Park, Sheffield. Mr. E. Worthington, English Steel's work-study engineer, explained problems connected with the plan to officers of the Vickers group last week.

It is believed that this will be the first time feeding direct from wagons has been done in this country and, to keep the furnaces supplied, it is envisaged that, eventually, 400 wagon loads a day will be required, which sets problems on the timing of the scrap trains. Because of the gradient, trains will be limited to 45 wagons a time.

One of the aims of direct tipping is to avoid unnecessary handling. There will be a stockyard of about 9,000 tons.

AUSTRALIA TO EXPORT IRON ORE TO JAPAN

AUSTRALIAN government has approved the first export of iron ore under a new policy for encouraging the discovery and development of ore deposits, and has given permission for the export to Japan of up to 200,000 tons of ore from a deposit near Grafton, New South Wales.

The deposit is one of a number which are of small interest to the Australian steel industry. The government expects exports under the Grafton licence to earn more than £A1,000,000.

Orders Placed

£1,000,000 AEI Contract

ENGLISH STEEL'S TINSLEY PARK DEVELOPMENT

ORDER worth nearly £1,000,000 has been placed by the English Steel Corporation, Limited, with the heavy plant division of Associated Electrical Industries, Limited, for electrical equipment for four rolling mills which are to be installed at the English Steel Corporation's new Tinsley Park Works, Sheffield. The equipment will include two 3,500 h.p., d.c. motors for the twin drive of a 42 in. blooming and slabbing mill which will be supplied by Davy & United Engineering Company, Limited, and the Brightside Foundry & Engineering Company, Limited, acting together as a consortium.

The two motors are to be installed with the upper motor nearer the mill than the other—this is the "top-forward" arrangement which was pioneered in the United Kingdom by AEI. Two 32-in. billet mills, which will also be supplied by the consortium, will be equipped with AEI motors—one of 4,000 h.p. and the other of 5,000 h.p.

The bar mills, for which the complete order has gone to the Brightside Foundry & Engineering Company, Limited, will comprise a reversing roughing mill driven by a 2,000 h.p. motor; an intermediate mill driven by a 1,000 h.p. motor; and a continuous mill driven by five 450 h.p. motors and two 350 h.p. motors.

As well as the main motors, AEI will supply and install steel-tank mercury-arc converters which will provide power for the d.c. motors; motor and rectifier ventilation equipment; all the d.c. circuit breakers; open type slate motor control panels; motor supervisory cubicles, electronic controls and magnetic amplifiers.

GEC Turbo-blower Order

REPEAT order worth £139,000 for the supply and installation of a second 100,000 c.f.m. turbo-blower at the Cleveland Works of Dorman Long (Steel), Limited, has been received by the General Electric Company, Limited. This, and another machine being built by Fraser & Chalmers Engineering Works, Limited, a subsidiary of GEC, will be placed alongside two existing 90,000 c.f.m. blowers which were supplied by the company. The blower, which is to supply air to blast furnaces, will be of the centrifugal type, having three impellers each of 66 in. diameter running at speeds up to 3,200 r.p.m.

The output on normal duty will be 100,000 c.f.m. against a pressure of 35 p.s.i.g., and on maximum duty this will rise to 110,000 c.f.m. against a pressure of 40 p.s.i.g. The drive will be provided by a steam turbine, direct-coupled to the blower, operating on steam conditions of 425 p.s.i.g. at 725 deg. F. Condensing plant will be supplied by Mirrlees Watson, Limited, Glasgow.

THROUGH ITS Canadian subsidiary, Simon-Carves of Canada, Limited, Simon-Carves, Limited, has received a contract to supply a coal preparation plant for the Crow's Nest Pass Coal Company, British Columbia. The plant will be capable of cleaning 120 tons per hour of minus ½-in. coal. It will be ready for commissioning in April, 1962. Participating in the contract, worth nearly £250,000, will be a Simon-Carves subsidiary—the Automatic Coal Cleaning Company, Limited, Carlisle—who will supply the feldspar jib washbox.

TWO MECHANICAL trenchers, worth about £2,300 each, were sold from the Aveling-Barford, Limited, site at this year's Leipzig Spring Fair.

A 27-WAGON TRAIN loaded with 270 tons of carbon electrodes has been exported to Italy by British Acheson Electrodes, Limited, Sheffield.

ORDER FROM the Eastern Gas Board for a Stretford sulphur extraction process plant has been received by R. & J. Dempster, Limited, Manchester. It will be installed at the Norwich gas works to treat 4,000,000 cu. ft. of gas a day.

SULPHURIC ACID PLANT and a single superphosphate plant is to be supplied by Simon-Carves, Limited, a member company of the Simon Engineering, Limited, group, as part of a new fertilizer factory which is to be built at Sukulu, near Tororo, for the Uganda Development Corporation.

COMPLETE ELECTRICAL equipment for a new cotton mill in the Philippines is being supplied by Associated Electrical Industries, Limited. The contracts, which will amount to over £100,000, are being received through the main contractor, Platt Bros. (Sales), Limited. The mill is for the Cottage Textile Development Corporation.

ORDER EXCEEDING £150,000 from the Anglo American Corporation of South Africa, Limited, has been received by the Fraser & Chalmers Engineering Works of the General Electric Company, Limited. It is for two complete double-drum winding engines for the main sub-incline shaft of the Bancroft Mines, Limited, Northern Rhodesia, and they will be installed in a chamber some 1,150 ft. underground.

A LARGE plate-stretching machine has been ordered by James Booth Aluminium, Limited, from Fielding & Platt, Limited, Gloucester. The machine, which will be in operation early next year, and will cost approximately £150,000, will be used for flattening aluminium alloy plates, for use in shipbuilding, in the transport industry, and various other engineering applications. The maximum length of plate which can be handled on the new 144-in.-wide machine, is 50 ft., and the maximum thickness is 1 in.

Coalfield News

Colliery Band Festival May be at Skegness

NATIONAL colliery band festival is being considered for Skegness. Distributing the awards in the band contest held at the seaside centre for Derbyshire Miners, Mr. H. Atkinson, chief officer and secretary of the Coal Industry Social Welfare Organization, said it was likely that the festival would be held at the centre.

Both the performance of the bands and audiences provoked some caustic comment by the adjudicators—Mr. E. C. Buttress and Prof. W. B. Hargreaves. Two Yorkshire bands—Grimethorpe and Markham Main, were first and second, respectively, and Creswell Colliery was third. First three in the second section were Langwith Miners' Welfare, Thoresby Colliery Welfare, and Bestwood Black Diamonds.

SIX SENIOR BOYS from Eton have paid a three-day visit to the Ayrshire coalfield. They stayed in miners' homes and visited the Barony and Killoch collieries.

IN RECOGNITION of winning the Riley Shield in the annual inter-team rescue contest for Yorkshire pits, each member of the Old Roundwood Colliery, Ossett, team has been presented with a travelling clock by the Old Roundwood Colliery Welfare Committee.

REDUCTION IN coal and coke shipments from the South Wales ports last week can be chiefly accounted for by the Good Friday holiday. The week's total of 32,663 tons was 19,341 tons lower than in the previous week and 3,307 tons below that for a year ago.

BRAVERY OF Michael Colliery miner, Mr. Thomas Pratt (58), Kirkcaldy (Fife), in rescuing a nine-year-old local boy from drowning at Kirkcaldy Harbour last September, was officially recognized on Saturday when he was presented with a Royal Humane Society testimonial.

WORK WAS RESUMED on Monday at Roslin Colliery (Midlothian), where 650 workers went on strike the previous Friday after the dismissal of a miner for allegedly assaulting an overman. The men returned on a recommendation of the Lothians branch of the NUM to go back, pending negotiations.

SOUTH STAFFORDSHIRE and Shropshire miners in the West Midlands Division of the National Coal Board have achieved an overall production record of 29.1 cwt. per manshift for the week ended March 25. This is 0.25 cwt. higher than the previous best figure reached early in February. Miners at Hamstead Colliery, Birmingham, also set up a new record with an OMS of 32.9 cwt.

SEVEN MINERS at Rothes Colliery, East Fife Area of the Scottish Divisional Coal Board, returned to the surface on Tuesday of last week after 33 hours underground. They came up after being assured by union officials that, if they did so, their grievance over a wage dispute would be settled more easily. The miners had stayed down in protest against being allocated jobs which they claimed lowered their earning prospects from 67s. 6d. a shift to 39s. 7d.

MR. ALEX MOFFAT has been nominated for the office of vice-president of the National Union of Mineworkers. Mr. Moffat, a Communist, is vice-president of the Scottish Area of the union and the brother of Mr. Abe Moffat, president of the Scottish Area. The national vice-president post is vacant because of the retirement of Mr. E. Jones, North Wales. Another candidate is Mr. F. Collindridge, of Yorkshire. Selection will be made by the national executive on April 13.

WORK ON THE £300,000 Banwen, South Wales, disposal point contract for the National Coal Board Opencast Executive has been started by Wilson Lovatt & Sons, Limited. The work comprises dismantling and re-erection of a washery and screening plant, together with extensive railway sidings, road works, and a wagon tippler.

ANOTHER RECORD LEVEL of productivity in the Durham Division of the NCB was achieved in the 12th week of the year. The overall average of 23.46 cwt. per manshift was 0.12 cwt. higher than the previous record set in February. In the corresponding week of 1960, overall productivity was 22.31 cwt. per manshift. At the face, productivity reached 67.07 (65.71) cwt. Overall productivity in the first 12 weeks of the year averaged 23.03 (22.07) cwt. per manshift and 65.83 (64.95) cwt. at the face.

Mineworkers' Boxing at Hamilton and Neath

NORTHERN finals of the 1960-61 mineworkers' boxing championships are being held at the Town Hall, Hamilton, tonight (Friday). The southern finals, to be held at the Gwyn Hall, Neath, will be on April 21.

Neath was chosen for this event mainly in recognition of the successful re-entry last year of the South-Western Division into the championships after an absence of two years. In last year's national finals at Glasgow the South-Western Divisional team won five individual national titles, as well as the two national trophies—the Mitchell-Hedges Trophy, awarded to the division gaining the most points at the divisional finals, and the Viscount Hyndley Trophy, awarded to the Area whose contestants gain the most points in the championships.

No fewer than six of the present 10 national champions will defend their titles at Neath.

The winners at Hamilton and Neath will go forward to the national finals at the Civic Hall, Wolverhampton, on May 5.

Belgium Seeks ECSC Aid for Re-employment of Miners

REQUEST for financial aid towards the re-employment of 5,000 miners affected by colliery closures this year has been made by Belgium to the High Authority of the European Coal and Steel Community. Until now, aid has been granted only for re-training and as distress subsidies.

A scheme has been under examination for developing distressed areas in the Borinage (Mons) and central Charleroi (La Louvière) districts, by which aid would operate through a specially constituted development company with the right to call on High Authority funds for laying out and equipping industrial trading estates.

The Belgian government is aiming to provide triple-tier assistance, comprising general aid, development area funds, and the High Authority aid. The Belgian contributions include cheap borrowing facilities, certain fiscal exemptions, and government guarantees.

THE COAL TRADE

ANY up-to-date chart of the coal trade would give ample indication that the general public is fully aware that summer prices are "around the corner" and only the floor of the coal cellar or bunker is kept covered—just in case. The sudden change in the weather, back to the more familiar English spring chill, has given rise to a crop of orders, but in most parts of the country they amount to little more than a hundredweight or two at a time. The growing demand for steam-raising smalls indicates a welcome expansion in industrial activity, but overall the improvement is offset by the reduction in the space-heating needs and also manufacturers' clear intention of getting rid of stocks as far as is safe.

DERBYSHIRE

There is a steady demand for most grades of household coal, which reflects moderate weather and the approach of summer prices, so that merchants tend to receive a fair number of orders, mostly for smaller quantities than usual. Supplies are fairly prompt for all grades, and additional tonnages are available on request. Best, hand-picked and the better grades of screened cobbles and brights are readily obtainable, with demand fair. Requests for cheaper brights are fairly frequent, and sufficient tonnages are being made available to meet all inquiries promptly. Large nuts are less popular, and arrivals are being watched carefully to balance them with demand. Washed trebles and doubles are still in fair request, and supplies are more readily obtainable than for some time.

Inquiries for gas coke nuts are limited, and smaller deliveries are being requested. Premium smokeless fuels continue to receive a fair amount of attention, and on the whole the supply position is much easier than of late. Domestic anthracites are coming forward a little more promptly, and merchants with a small turnover are somewhat apprehensive about accepting supplies when summer prices are only a week or so away. There is a steady call for Phurnacite and supplies are satisfactory.

Industrial consumers continue to maintain a steady pressure for delivery, and most coals are becoming easier to obtain so that few difficulties are reported. Nutty slacks are fairly readily obtainable. Demand for dry screened nuts is fairly firm, and supplies are coming to hand in a satisfactory manner. A normal rate of inquiry for hard steam coals is being met without difficulty. Washed fuels are still keenly sought, and most tonnages are being taken up against contract commitments. Demand for cokes for industrial purposes is only moderate, and little difficulty is experienced in meeting promptly current orders for all grades.

Coal Holds its Own with Oil in Fuel Consumption Rise

THE Treasury's Economic Survey for 1961, published as a White Paper on Wednesday, shows that while the country's consumption of fuel last year increased by nearly 20,000,000 tons coal equivalent to 264,000,000 tons, this increase was divided equally between coal and oil, instead of oil getting the greater share as in previous years.

The survey also shows that the metals, construction and engineering industries were among those showing the largest increases in production during 1960, while the biggest decline in output was in vehicles, followed by shipbuilding and coal mining.

Still More Coal Used Than Won

FOR a fortnight coal output is going to be affected by the Easter holiday. Last week the break meant a drop of about 500,000 tons, but the total output of saleable coal was less than 100,000 tons down on the comparable week last year. However, the changeable weather has meant that coal consumption keeps well above output and undistributed stocks continue to dwindle.

There is, however, a noticeable slowing-down in the rate of diminution in the industry, particularly in the drain on manpower, which dropped by less than 300 faceworkers in the week ended March 25 and by 810 overall.

There were 579,050 wage-earners on colliery books on March 25, against 617,210 on March 26, 1960, the numbers engaged at the coal face being 217,400 and 236,740 respectively. Total absenteeism (all workers) in the week ended March 25 was 13.44 per cent., compared with 15.14 per cent. in the week ended March 26, 1960. Output at the face was 4.138 tons and overall 1.446 tons in the week ended March 25, compared with 4.031 and 1.431 tons in the week ended March 26, 1960.

The following table gives (in tons) the revised output of saleable mined coal by division in the week ended April 1, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended April 1, 1961.		Week ended April 16, 1960.*
	Total output.	Tonnage lost.	Total output.
Scottish	358,000	10,000	367,000
Northern (N&C) ..	193,000	55,000	196,000
Durham	375,000	97,000	365,000
North-Eastern ..	814,000	5,000	823,000
North-Western ..	191,000	52,000	222,000
East Midlands ..	789,000	98,000	807,000
West Midlands ..	273,000	—	291,000
South-Western ..	372,000	7,000	395,000
South-Eastern ..	30,000	—	29,000
Great Britain—			
Deep-mined coal ..	3,395,000	324,000	3,495,000
Other deep-mined (including licensed mines) ..	40,000	—	45,000
Open-cast coal ..	159,000	—	145,000
TOTAL	3,594,000	324,000	3,685,000

* Comparable week last year.

ELGAR MACHINE TOOL COMPANY, LIMITED—Mr. J. A. Perkins has been appointed a director.

Northern (N&C) Division's Drive for Boy Recruits

STATING that a considerable number of openings for boys exist at collieries in Northumberland and Cumberland, the Northern (N&C) Division of the National Coal Board says that in 1961 the division will need to recruit about 900 school-leavers. During the preliminary training period given to these new entrants, who will receive full pay during training, there will be selection, according to aptitude, for the National Coal Board's apprenticeship scheme for engineering craftsmen. Some 250 apprentices will be selected for this scheme from the total number of recruits.

After preliminary training, all juveniles will continue under skilled supervision at collieries and other centres, and they will be encouraged to study for further advancement in their careers. In some cases, part-time day release is granted and in others, the boys are enabled to take full-time courses at technical and mining colleges. The board's educational "Ladder Plan," which includes opportunities to gain university scholarships, enables any boy in the industry to obtain qualifications for the highest positions in the board's service.

Mr. F. A. Millican, Divisional industrial relations director, in announcing the target, said: "A great reconstruction programme has been carried out and it is the board's intention to make the maximum use of modern equipment where this will increase efficiency. Our modern mines offer countless opportunities to boys whose interests lie in the handling, maintenance, and development of modern machinery, both at the pits and in our up-to-date workshops."

Modernization of Ashington "Miner's Dream Come True"

THE £1,000,000 modernization scheme involving 2,279 colliery houses at Ashington (Northumberland), often termed Britain's biggest mining village, is described as a "miner's dream come true" in an article by Mr. Thomas R. Chape, in Town and Country Planning. Some 400 houses have been modernized since the scheme began, says Mr. Chape. Modern kitchenettes have taken up yard space or replaced the wooden or brick-built back kitchens. Gas cooking has been installed for the first time, and the miner's wives and their families have discarded the tin bath in front of a roaring fire for the luxury of a bathroom—small but compact.

Mr. Chape says that the modernization plan has produced a scene of startling contrast. "Facing colliery rows have a neat, trim appearance. Instead of outhouses and washhouses separating the streets, there are open green spaces." The estimated cost of bringing each house up to date is £600. The local authority contributes half the cost of improvements.

DURING THE WEEK ended March 18 the "N" Ajax furnace of the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, had the distinction of being the first furnace at the works to make more than 6,000 tons of ingot in a week. The furnace make was 6,164 tons, the previous best being 5,870 tons during the week ended December 17, 1960.

European Coal Output

THE appended figures relating to coal output and imports are taken from statistics issued from Geneva by the Coal Committee of the Economic Commission for Europe.

Tonnages are metric, and the number of underground workers employed relates approximately to the end of the month.

TABLE 1.—*European Coal Output (Metric Tons) and Employment.*

Country.	Output.		Underground employment.	
	December, 1960.	November, 1960.	December, 1960.	November, 1960.
Belgium	1,731,000	2,015,000	77,000	78,000
France	4,734,000	4,787,000	125,000	125,000
Italy	58,000	60,000	—	—
Netherlands ..	1,097,000	1,170,000	28,000	28,000
Poland	9,053,000	9,013,000	—	213,000
United Kingdom ..	18,580,000	15,983,000	466,000	467,000
Spain	1,447,000	1,191,000	—	—
Western Germany ..	12,129,000	12,333,000	298,000	297,000

TABLE 2.—*European Solid-fuel Imports in December, 1960, with Figures for November, 1960, shown in Brackets (Metric Tons).*

Importing country.	Coal and patent fuel.	Coke.	Lignite and brown coal briquettes.
Austria	323,000	78,000	86,000
	(366,000)	(88,000)	(100,000)
Belgium	391,000	23,000	6,000
	(374,000)	(22,000)	(8,000)
Denmark	451,000	147,000	26,000
	(379,000)	(161,000)	(31,000)
Finland	360,000*	20,000*	—
	(357,000)	(21,000)	(—)
France	841,000	433,000	50,000
	(934,000)	(436,000)	(37,000)
Greece	11,000*	2,000*	—
	(11,000)	(2,000)	(—)
Eire	130,000*	1,000*	—
	(130,000)*	(1,000)*	(—)
Italy	870,000*	20,000*	15,000*
	(869,000)	(20,000)*	(15,000)*
Luxembourg	21,000	350,000	11,000
	(21,000)	(332,000)	(12,000)
Netherlands	665,000	31,000	22,000
	(631,000)	(26,000)	(23,000)
Norway	45,000*	25,000*	—
	(45,000)*	(25,000)*	(—)
Portugal	41,000	6,000	—
	(17,000)	(3,000)	(—)
Sweden	215,000	169,000	1,000
	(203,000)	(215,000)	(2,000)
Switzerland	137,000	30,000	24,000
	(153,000)	(40,000)	(20,000)
United Kingdom	—	—	—
	(—)	(—)	(—)
Western Germany	684,000*	31,000	500,000*
	(658,000)	(33,000)	(513,000)

* Secretariat estimate.

15 TONS OF COAL A MINUTE LOADED AT BLYTH

FIFTEEN tons of coal each minute of the day and night were at one time being loaded from the three British Railways staithes at Blyth handling the recent record-breaking coal shipments from the port. A peak in coal shipments from the port was reached in the first week of February with 151,400 tons.

Although the weekly tonnages have now dropped slightly from this peak figure, shipments are still about 10,000 tons above the weekly average.

GREENGATE & IRWELL RUBBER COMPANY, LIMITED—Mr. F. H. Puxty and Mr. F. E. Winstanley, have been made directors.

Company News

STEWARTS AND LLOYDS ISSUE

Rights Offer to Raise £13,200,000

GROSS sum of £13,200,000 is to be raised by a rights issue of 6,000,000 £1 ordinary shares at 44s. each by Stewarts and Lloyds, Limited, steelmakers, tube manufacturers, etc. The offer is expected to be on the basis of two shares for every nine held on March 21, and net proceeds of £12,920,000 will be used to repay bank overdrafts of £4,711,305 at March 15, with the balance going towards capital expenditure.

The capital programme includes the major development of the Corby iron and steel works and tube works, which will increase capacity by nearly 500,000 ingot tons, at an estimated cost of about £35,000,000 over three to four years. In addition, there is outstanding some £20,000,000 on capital schemes authorized by the board for other sections. Retained profits and proceeds of the present operation will meet a large proportion of these requirements, but it is expected that further permanent or long-term capital will be needed in due course.

Unless present trading trends improve, profits for the current year will be lower than for the year to October 1 last, shareholders are expected to be told. In order to reduce the disparity between the interim and final dividends, it is intended to pay an interim of 5 per cent. in July on the present capital. Prospective final dividend is expected to be 10 per cent. on the increased capital of £33,000,000. The board is confident that the long-term prospects will be enhanced by the projected developments, which will reduce relative production costs and increase capacity.

LANARKSHIRE BOLT (HOLDINGS), LIMITED—Group net profit for 1960 increased to £71,502 (£40,172) after tax of £49,000 (£33,978).

BIFURCATED & TUBULAR RIVET COMPANY, LIMITED—The final dividend of 13¼ per cent., less tax, on capital doubled by scrip issue, makes an equivalent of 17¼ per cent., less tax, for 1960 (equivalent 10 per cent. tax free).

DANIEL ADAMSON & COMPANY, LIMITED, water tube boiler makers, etc., of Dukinfield (Ches)—Group pre-tax profits fell to £10,403 (£98,503) and the total dividend is cut by 7 per cent. to 8 per cent. with a 5 per cent. final.

SANGAMO WESTON, LIMITED, manufacturing electrical engineers, of Enfield (Middx)—The dividend is raised to 13¼ (11) per cent. and a one-for-three scrip issue is proposed. Net profit rose to £202,875 (£164,608), after tax of £198,395 (£146,214).

METAL CLOSURES, LIMITED—The dividend is being raised from the equivalent of 9·6 per cent. to 11¼ per cent. for 1960 with a final of 6½ per cent. Group profits expanded from £856,066 to £1,121,177 and the net profit from £482,788 to £596,311.

ABBOTT BIRKS (HOLDINGS), LIMITED, parent company for makers of tools and appliances for gas, water, and electricity undertakings, of London, S.E.1—The turnover of subsidiaries increased, but the net profit did not show a proportionate rise, states the chairman, Mr. Norman A. Birks. Net profit dropped from £55,306 to £53,391. Reversion to 12½ (15) per cent. on the ordinary is recommended.

BAKER PERKINS, LIMITED, manufacturing engineers, iron, steel, and brass founders, etc., of Peterborough—The company is acquiring James Halley & Sons, Limited, makers of rotary printing machinery, etc., of West Bromwich, for £178,800 cash.

WILLIAM DENNY & BROS., LIMITED, shipbuilders and repairers, of Dumbarton—The ordinary dividend is maintained at 15 per cent. but the special dividend of 5 per cent. paid in 1959 is omitted. Net profits fell to £71,815 (£112,784), after tax of £119,059 (£145,128).

MORGAN CRUCIBLE COMPANY, LIMITED—Reorganization of the company has been completed and it became a holding company on Tuesday. As reported previously, five new wholly-owned subsidiaries have assumed the responsibilities for production, trading, research, and development.

MILLOM HEMATITE ORE & IRON COMPANY, LIMITED, pif-iron makers and founders, of Millom (Cumberland)—The company, a subsidiary of the Cranleigh, Limited, group, has acquired for a nominal consideration all of the share capital of Sadler & Company (Coke Ovens), Limited, of Evenwood (Co. Durham).

F. W. BERK & COMPANY, LIMITED—The authorized share capital has been increased from £2,000,000 to £2,250,000 by the creation of 1,000,000 additional ordinary shares of 5s. each which have been allotted in satisfaction of the purchase consideration for the whole of the issued share capital of St. Albans Sand & Gravel Company, Limited.

SIR WILLIAM ARROL & COMPANY, LIMITED, bridge builders and engineers, of Glasgow—Trading profits, after depreciation, rose from £461,772 to £635,712, and the net profit is up from £292,514 to £347,801. The dividend is being increased by 2½ per cent. to 12½ per cent., with a final of 7½ per cent. Last August holders also received a capital distribution equal to 2½ per cent.

TECALEMIT, LIMITED, lubrication, hydraulic, and filtration engineers, of Feltham (Middx)—The company has purchased 25,000 non-cumulative 5 per cent. £1 preference and all the 25,000 £1 "B" ordinary shares in British Filters, Limited, Maidenhead (Berks), making that company—formerly an associate—a wholly-owned subsidiary. The consideration was 300,000 ordinary Tecalemit 5s. shares.

CAWOOD HOLDINGS, LIMITED (Cawood Wharton & Company, Limited)—The capital of Thrutchley & Company, Limited, and its subsidiaries has been acquired in a £736,250 cash deal. The Thrutchley group companies are distributors of solid fuels and fuel oils, activities which are complementary to those

of the Cawood group. The various businesses will be carried on under the same management as before.

POWELL DUFFRYN, LIMITED—Whole of the issued share capital of Andrew Air Conditioning, Limited, Stockport, has been acquired. Mr. A. W. Alexander, chairman, Mr. W. Hamnett and Miss F. Rowbotham retire from the board of the Andrew company. Mr. S. Holt continues as managing director and Mr. W. H. Sharland, deputy chairman, and Mr. Miles B. Reid, a director of Powell Duffryn, have joined the board. Mr. Sharland has been appointed chairman.

R. W. CRABTREE & SONS, LIMITED—Share capital of the Cundall Folding Machine Company, Limited, which specializes in the manufacture of paper-folding machinery and feeders, has been acquired. The company will continue to be directed by Mr. Trevor Miller. Mr. S. D. Miller will also remain on the board. Mr. Charles H. Crabtree, Mr. Peter N. Crabtree and Mr. A. Rayner will join the board of Cundall, representing the parent company. Mr. C. H. Crabtree will be chairman.

DARLINGTON WIRE MILLS, LIMITED—Despite a larger profit last year, Mr. B. E. Pigg, the chairman, warns that the current order-book of the parent company is not as satisfactory as he would wish. This is attributable to certain mergers in the roping trade and a general falling off in demand, particularly in the export market. "Certain redispositions, however, were effected in the mills during 1960, which, it is hoped, will offset these adverse factors by improving economic working," he says.

DELTA METAL, LIMITED—The chairman, Mr. W. E. Ogden, points out that in any programme of development there must inevitably be periods when a considerable amount of spadework has to be done with little immediate gain and it is likely the group may be entering such a phase now. However, when new plans now in hand fructify, profits "should take another surge forward." It is proposed to create 16,000,000 new 5s. ordinary shares, but the board has no immediate issue plans.

WATFORD ELECTRIC & MANUFACTURING COMPANY, LIMITED—A probable rights issue is to be made to help finance a new factory project, states Mr. J. L. Lawson, chairman. Purchase of the freehold of a small factory some distance outside the Watford area is sought, and the acquisition would enable rapid expansion of production. Mr. Lawson forecasts more favourable results for the current year than in 1960. The value of orders received is at a very high level, with the order-book reaching a company record.

GLYNWED TUBES, LIMITED—As forecast, 22½ per cent. is to be paid for 1960 and it is proposed to raise £1,000,000 by a one-for-10 rights issue at 20s. per 5s. share. Group profit for 1960 of £1,811,496, compares with £1,231,501 previously, and includes £412,329 in respect of subsidiaries acquired during the year. A final dividend of 13¾ per cent. is recommended. The 22½ per cent. total, on the present £2,500,000 capital as increased by a three-for-seven issue, compares with the previous 17½ per cent. equivalent.

EXPANDED METAL COMPANY, LIMITED—At present the business is developing at a satisfactory rate, says Sir Patrick G. Hamilton, chairman, and the profits of 1961 and 1962 will bear the costs of developments. The directors propose to increase the authorized ordinary capital by 3,300,000 5s. shares, so that adequate capital is readily available. There is no present intention of issuing any of the new shares, and the board says it would seek stockholders' approval if it intended to issue shares "so as to cause a radical variation of control of the company, or the nature of its business."

Obituary

SIR ALEXANDER ROGER

FOR many years an outstanding figure in the cables and telecommunications industry, Sir Alexander Roger died on Tuesday, aged 83. He joined the board of British Insulated & Helsby Cables, Limited, in 1918 and was elected chairman in 1930. On the amalgamation of the old BI company with the Callender Company in 1945, he became chairman of the new British Insulated Callender's Cables, Limited, and on his retirement in 1954 he became the company's first honorary president.

As chairman of the Birmingham Small Arms Company, Limited, he did much to restore its fortunes which had been seriously affected by the depression of the 1930s. He was knighted for his services to the Ministry of Munitions in the first world war and in May, 1940, was chosen to preside over the Tank Board to advise the Minister about the production and design of tanks. He was a vice-president of the Federation of British Industries.

MR. ANDREW B. LAWSON

PAST president of the Scottish branch of the National Association of Colliery Managers, on which council he served for 16 years, Mr. Andrew B. Lawson has died in Newcastle. He began his mining career at Bardykes Colliery in 1909 and after attending the Royal Technical College, Glasgow, he obtained his mining certificate in 1911 and was appointed undermanager at Bannockburn Colliery, near Stirling, in 1913. During the next 25 years he served as manager at collieries all over the country and in 1936 he became agent and director of Wallsend & Hebburn Coal Company, Limited, Newcastle-upon-Tyne.

Upon nationalization, Mr. Lawson was appointed general manager of No. 7 Area, Northern Divisional Coal Board (now Northern N&C) and in 1953 he became general manager of No. 2 Area. Mr. Lawson had toured mining areas in many parts of the world, including America and Germany.

Manager of the purchasing and stores department, East Ayr Area, Scottish Divisional Coal Board, Mr. WILLIAM MURRAY died recently in hospital. He was 57.

One of the first miners at Mary Colliery, West Fife Area, Scottish Divisional Coal Board, to be awarded the 50 years' service certificate, Mr. JOHN STEELE has died at the age of 92.

Mr. WILLIAM ROBB, who has died at the age of 56, was with the Falkirk Iron Company, Limited, until 1946, when he was appointed foundry manager with an associated company, McDowall Steven & Company, Limited.

Mr. JOHN HENRY PICKTON, rolling mills manager with Monks, Hall & Company, Limited, Warrington (Lancs), has died at the age of 54. He had served with the company for 40 years, and had previously been rivet works manager and chief inspector of finished products.

The death has occurred of Mr. GEORGE HARDMAN, chairman of Platts (Sales), Limited, and managing director of Textile Machinery Makers, Limited, both associated companies of Prince-Smith & Stells, Limited, worsted machinery manufacturers, of Keighley (Yorks).

NEWS IN BRIEF

MATBRO, LIMITED, Horley (Surrey), announces a barter deal with Columbia for the exchange of fork-lift trucks for coffee—value $23,000.

ATLANTIC STEEL COMPANY, of Atlanta, Georgia, has cut the price of reinforcing bars by 25 per cent. per 100 lb. to $5 per 100 lb. f.o.b. mill. Price cutting by foreign sellers is regarded as the reason for the cut.

AGREEMENT has been signed between M.L. Holdings, Limited, through its subsidiary, M.L. Engineering (Plymouth), Limited, with L. M. Ericsson, of Sweden, for the sale and manufacture of railway signalling equipment in the UK.

FUJI IRON AND STEEL concern of Japan is planning the building in Singapore of a steelworks with an annual capacity of from 100,000 to 200,000 metric tons. Fuji is to ask the Export-Import Bank for credit for the operation of US $17,160,000.

MOBILE CRANE exhibited at the Leipzig Spring Fair by Ransomes & Rapier, Limited, the RapieR 1520, has been sold to East Germany for use on State building projects. The crane loads up to 15 tons and is one of the latest additions to the company's range.

FOR THE FIFTH YEAR running "Telcon Terribles"—a team from the Telegraph Construction & Maintenance Company, Limited, Crawley (Sussex), won the British marbles championship at Tinsley Green. Mr. Leonard Smith, a member of the team, retained the individual championship.

UNEMPLOYMENT in the UK, totalling 350,838, fell last month in all industries except shipbuilding and marine engineering, where there was a rise of 1,000, according to Ministry of Labour figures. The number of unfilled vacancies rose by 2,200 in engineering and electrical goods, and by 1,200 in vehicles.

MANAGING DIRECTOR of the Stanton Ironworks Company, Limited, near Nottingham, Mr. N. C. Macdiarmid, presided at the company's ninth annual presentation to long-service employees last week. Sir Frederick Scopes, chairman of the company, presented watches to 91 employees who joined the company in 1930.

AT THE REDBOURN (Scunthorpe), steelworks of Richard Thomas & Baldwins, Limited, accident figures for 1960 reached a record low level—0.65 per 100,000 hours worked. Only 42 out of the 4,000 employees had an accident which caused them to lose time at work. The previous lowest figure was in 1957—0.71.

MINING OPERATIONS have been suspended because of unsafe conditions at the Coalbrook North Colliery of Clydesdale (Transvaal) Collieries, Limited, South Africa. Plant from the mines will be used to help raise production at Clydesdale's Coalbrook South Colliery, where it is hoped to make good the 75,000 tons a month lost from the North mine.

NATIONAL COAL COUNCIL of Belgium has announced that the Jemeppe pit of the Elisabeth coal-mining group in Charleroi is to be closed during the current year. This brings the total capacity of pits for closure to 1,807,000 metric tons compared with the 2,000,000 tons required by the High Authority of the European Coal and Steel Community to be reached in Belgium this year.

NEW PLANT to cost about £250,000 to be installed by the Scottish Stamping & Engineering Company, Limited, Ayr, will eliminate grit and smoke. The company, a member of the Guest Keen & Nettlefolds, Limited, group, has spent thousands of pounds trying to solve the problem. The new plant will replace steam operated stamping hammers with ones using compressed air.

NEW RANGE OF hydraulic gear pumps has been developed by Joseph Young & Sons, Limited, Bolton. The units are of the constant displacement type, and are primarily intended for heavy duty involving operations such as mechanical handling, coal-mining appliances, earth-moving vehicles, and hydraulic control systems. The four basic units have capacities from 12.5 to 30 g.p.m. at 1,000 r.p.m.

NEW RATEABLE value of the Clydebank shipyard of John Brown & Company, Limited, has gone up by more than 500 per cent.—from £18,119 to £104,556. An appeal is to be made. In Dumbarton, the shipyard of Wm. Denny & Bros, Limited, shows an increase in rateable value from £11,250 to £33,385. At the Babcock Wilcox, Limited, engineering works at Dalmuir, the new rates figure is £10,312 (£44,129).

GOVERNMENT BILL for the establishment of a new department to be called the Department of Technical Co-operation has been published. The purpose of the department is "to co-ordinate, promote, and carry out arrangements for furnishing countries outside the UK with technical assistance (including assistance in economic development, administration and social services). A Minister in charge of the department is to be appointed.

LARGEST OIL-FILLED cable for commercial use has been made for the Hydro Electric Power Commission of Ontario by British Insulated Callender's Cables, Limited, at Belvedere (Kent). It is a single-core 230 kV cable and the 2.16 sq. in. conductor consists of six stranded segments laid round a central oil duct. Installation work will be carried out under the supervision of Philips Electrical Company, Limited, a member of the BICC group.

SEVENTEEN MPs from constituencies in the North East have tabled a Parliamentary motion alleging discrimination against the Swan, Hunter, & Wigham Richardson, Limited, shipyard at Wallsend. The motion views with concern the statement by the Minister of Transport, Mr. Marples, that in the event of equal tenders being submitted for the new "Queen" liner, the contract will go to a yard in a development area. This, it is said, would exclude Swan Hunter's shipyard.

PROGRAMME OF THE 1961 Scottish Conference of the British Institute of Management, which will be held at Gleneagles (Perthshire), on April 21-22, will highlight the special factors involved in success in the export field. Sir James Hutchinson, president of the Association of British Chambers of Commerce and chairman of Grampian Holdings, Limited, Glenfield & Kennedy, Limited, and Ailsa Shipbuilding Company, Limited, will examine the whole field of management for exports in his address at the closing dinner.

IT IS OFFICIALLY announced that R. S. Hayes (Pembroke Dock), Limited, has decided to go into voluntary liquidation. A circular sent out by the firm states: "Our shiprepairing business has been experiencing difficult times brought about by a combination of the Government's policy of confining most of the warship work to Royal dockyards and the major recession from which the shipping industry is suffering. While we hoped to ride out the storm, the future prospects are such as to make this impossible. The same remarks apply to our subsidiary company, Landmar Electrical Engineering, Limited."

ISSUED BY THE NATIONAL COAL BOARD

IN 1887 TWELVE MEN in a small workshop in Raleigh Street, Nottingham, were making three bicycles a week. Today, the Raleigh plant and offices have a payroll of over 8,000 and turn out over 1,000,000 cycles and over 2,000,000 Sturmey-Archer hubs every year. Such is the proud record of this famous cycle company. Obviously the shrewd men who control such a thriving concern have a flair for making long-term decisions that are both wise and profitable. Raleigh use *coal* because all their experience has proved that coal gives them all the steam for both power and heat they need at the lowest possible cost. Raleigh are *expanding* on coal because they know that our coalfields contain all the coal that industry can use for many scores of years to come.

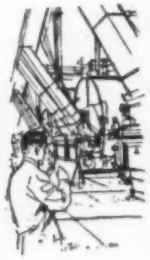
cycle at Raleigh

When it is your turn to cast a vote on fuel, remember Raleigh. Coal is the power that starts their wheels spinning so profitably. You can make *sure* that the wheels of your industry do the same for you when you stake your future power on the most reliable of all fuels—coal.

PROGRESSIVE INDUSTRY IS GOING FORWARD ON

COAL

Policy into practice at Raleigh Industries



Mr. L. L. Roberts,
Director of Factories, comments:

"Coal is the fuel chosen for the whole of Raleigh's power-raising plant, including our newest installation which comprises four horizontal economic boilers. These operate on ½" washed smalls, and have a combined total rating of 74,400 lbs. of steam output per hour from and at 212°F. An overall average efficiency of 72-75% can be easily maintained, although under test conditions we have recorded efficiencies of 80%.

All our coal handling plant is fully mechanised and apart from periodical trimming of the receiving bunkers, the fuel doesn't have to be touched at all by our boilermen anywhere from the delivery bays to the firebeds. After burning, the ash residue is automatically conveyed to overhead storage bunkers outside the boilerhouses, from where it is easily discharged into lorries for disposal.

Our emergency stocks of coal are relatively small. We prefer to operate on a direct supply basis from colliery to boilerhouse for more or less immediate use. This would not suit every firm, but in our special circumstances I am perfectly satisfied that deliveries are reliable enough to make this system dependable, and the possibility of an emergency arising out of failure of supply is very remote. We have operated this way for three years now without any trouble at all and will continue to do so in the future.

Raleigh's decision to use coal is based on economics. We want maximum reliability at the lowest possible cost—and I'm happy to say that with coal that's exactly what we get."

And here are some key facts and figures about the No. 1 Boilerhouse (Orston Drive)

Boilers	4 Horizontal Economic Boilers
Total Capacity	74,400 lbs. of steam per hour
Method of firing	Chain grate stokers
Steam pressure	80 p.s.i.
Steam temperature	324°F
Annual fuel consumption (*all boilerhouses*)	22,300 tons of coal

"Massive Expansion" Plan for United Steel

SPEAKING in Sheffield recently to more than 100 former apprentices of the United Steel Companies, Limited, Mr. H. Darnell, general works manager of Steel, Peech & Tozer, branch of United Steel, told of the plans for massive expansion. He said that the proposed projects would raise the capital per United Steel worker by £1,500 to a figure of £5,900 per head. With the exception of the Steel Company of Wales, Limited, he went on, United Steel had spent more money per employee on capital investment than any other steel company.

New projects at another branch—Appleby-Frodingham Steel Company—were planned, which would cost £38,000,000. Steel, Peech & Tozer was spending over £10,000,000 on development. The output of Samuel Fox & Company, Limited, another subsidiary, would be increased from 400,000 to 500,000 ingot tons a year and the company would be spending £4,500,000 on expansion.

Because of United Steel's expansion, Mr. Darnell went on, the company would be looking for young men who could be groomed ultimately to take over senior executive posts. "No one joining the company need feel that his future prospects are entirely dependent on the opportunities which are open in the particular branch in which he joined," he said. "Executive cross-postings are a regular occurrence."

ACQUISITION OF BROMFORD IRON & STEEL

ISSUED share capital, comprising 1,200,000 ordinary 2s. shares in the Bromford Iron & Steel Company, Limited, hot and cold rolled strip manufacturers, of West Bromwich, is to be acquired by F. H. Tomkins, buckle manufacturers, of West Bromwich. The purchase consideration is £20,000 cash, and the allotment of the unissued 800,000 Tomkins' 1s. shares. The consideration was negotiated on the basis of 7s. per Tomkins' share.

It is proposed to increase the share capital of Tomkins and to apply £150,000 of the new share premium account arising from the acquisition in satisfaction of a one-for-one scrip issue. It is intended that Tomkins will transfer its undertaking and assets to a new operating company, and the function of Tomkins will be restricted to that of a holding company only.

The net book value of Bromford Iron, it is stated, is in excess of £225,000, and at the end of December, 1960, profits were running at the rate of not less than £60,000 per annum. Mr. Harold Tomkins and Mr. A. L. Tomkins will be appointed directors of Bromford, and Mr. C. C. Cooper and Mr. V. D. Royston will be appointed to the board of Tomkins.

H. J. BALDWIN & COMPANY, LIMITED, cable cover manufacturers, etc., of Nottingham—The directors have decided to pass the half-yearly dividend on the 7 per cent. cumulative preference shares due and payable on March 31. The last payment was made on September 30, 1960, in respect of the six months ended that date. Further payment is to be deferred pending the group result for the current year ending April 30 next, in conjunction with an assessment of the effect of the reorganization of the operating and trading methods of the group.

Finland Signs Agreement with EFTA Countries

AGREEMENT of Association between the member states of the European Free Trade Association (EFTA) and Finland has been signed in Helsinki. Under the agreement Finland and EFTA assume broadly the same commercial rights and obligations towards one another as members of EFTA have already assumed between themselves.

EFTA countries reduced their duties towards one another by 20 per cent. on July 1, 1960, and have already agreed to make a further 10 per cent. reduction on July 1, 1961. Finland took just under £50,000,000 worth of UK exports and re-exports last year and about one tenth of UK exports are in goods covered by the retarded timetable for elimination of the tariff or by the exemption from the normal EFTA rules for removing quantitative restrictions on imports.

Products on which the reduction of Finland's import duties will be retarded after the initial one fifth reduction on July 1, 1961, include:—Propellent powders, percussion and detonating caps, igniters, and detonators; conveyor or elevator belts or belting of vulcanized rubber; tubes and pipes of cast iron, iron or steel casks, cylinders, cables, barbed wire, gauze, expanded metal, chain, anchors, nails, bolts, needles, pins, and springs; iron or steel central heating boilers, articles of a kind commonly used for domestic purposes, iron or steel wool, and other articles; electrical generators and motors weighing not more than 250 kg net.

Products excluded from the normal rules relating to relaxation and eventual removal of Finland's quantitative restriction on imports include:—Natural calcium phosphates, natural aluminium, calcium phosphates, apatite, and phosphated chalk; briquettes, ovoids and similar solid fuels manufactured from coal; coke and semi-coke of coal, lignite, or peat; tar distilled from coal, lignite, or peat and other mineral tars; oils and other products of the distillation of high temperature coal tar; natural bitumen and asphalt and bituminous shale, asphaltic rock and tar sands and bituminous mixtures based on natural asphalt and bitumen.

AEI Official Retires After 41 Years with Company

AFTER 41 years' service with the company, Mr. Charles Grad, AEI University liaison officer and consultant to Associated Electrical Industries (Rugby), Limited, retired at the end of March. Until the end of 1959, he was manager of the education department at Rugby.

Mr. Grad was chairman of the Birmingham branch of the Institution of Engineering Inspection 1937-38, founder member and chairman of the Coventry branch of the same institution 1938-39, and president of the Rugby Engineering Society, 1933-34. He has been a member of the Rugby College of Engineering Technology for many years.

Mr. G. O. Pritchard, formerly manager of the traffic department of Associated Electrical Industries (Rugby), Limited, also retired at the end of last month after 37 years' service. Mr. Pritchard gave up the position of traffic manager last December, but remained with the company as consultant until his retirement. He is a member of the Institute of Transport.

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EXTREME RESISTANCE TO ABRASION
(Hardness of aggregate 7·5 MOHS. Cuts glass)

ENORMOUSLY HIGH STRENGTH IN A MATTER OF HOURS
(For example 12,000 lbs. per sq. inch at 24 hours and 16,000 lbs. per sq. inch at 7 days)

HIGH DENSITY
(167 lbs per cu. ft. air-dried-20 lbs per cu. ft. higher than normal)

HEAT-RESISTANT
(up to 1150/1200°C)

OR ALL ABOVE PROPERTIES COMBINED

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AP91

Brown Bayley Group Profits Rise

WITH a final dividend of 9 per cent. Brown Bayley, Limited, a holding company formed to acquire the Brown Bayley steelworks, at Sheffield, is paying 14 (12) per cent. for 1960. Group net profits were £207,601 (£189,118) after tax of £131,857 (£105,932 and a special credit of £8,455). The 1960 figures include a complete year's dividends paid and recommended by the two subsidiaries, Hoffman Manufacturing Company, Limited, and Brown Bayley Steels, Limited.

Group net profits of Brown Bayley Steels rose to £601,942 (378,549) after tax of £497,848 (£311,783) less £25,223 (£30,540) unrequired tax. Final dividend of 11 per cent. makes 16 (13¼) per cent. for 1960.

Hoffman Manufacturing announces a final of 13 per cent. to make 20½ per cent. for 1960 on a capital doubled by a scrip issue. The previous year's equivalent was 18 per cent. Group net profit of £1,049,390 compares with £987,171 after tax of £686,563 (£717,340).

George Cohen's Shipping Manager Retires

AFTER more than half a century with the company, Mr. James Brennan, shipping manager for more than 30 years for George Cohen Sons & Company, Limited, retired last Friday. During his service with the firm, which was established in 1834, Mr. Brennan has seen outstanding developments.

He can recall the days of sail when clippers on the Australian run would carry cargoes of rails as ballast at 2s. 6d. a ton. Since then the activities of the company's shipping department have expanded enormously and, taking into account new steel and new and secondhand machinery, as well as scrap, Mr. Brennan has for long been responsible for the shipment of many hundreds of thousands of tons of cargo a year.

He is a founder member and first honorary secretary of the 600 Group's "25 Club" formed in 1952, and one of the first "long service" associations to be started in industry. Membership of this has now reached over 600.

Fear of Redundancy at Glasgow Loco Works

DISCUSSING the report of the general council of the Scottish Trades Union Congress last weekend, Mr. Thomas Coughtrie, chairman of the North British Locomotive Company, Limited, Glasgow, said that everything possible was being done to keep redundancy in the firm to a minimum. The report refers to the anxiety felt over "continuing redundancy" at the Queen's Park and Hyde Park works of the company, and states that if there is no alteration in the firm's prospects there will be a reduction in working personnel from about 1,500 to around 600 by June or July of this year.

Mr. Coughtrie said he had no doubt about the future of the company. It was passing through difficult times financially, but it would survive. A policy of concentration had been embarked upon and there was bound to be a reduction in the labour force for a time. He hoped that the company would not have to run down its strength to the figures mentioned in the report.

Ore Chartering

OWING to some shortage of ready tonnage, certain of the major sections of the market continue to move against charterers. From the Mediterranean area, conditions from an owner's point of view are extremely poor. There is, in fact, almost a dearth of large prompt cargoes. Indian Ore has paid 48s. 6d. f.i.o. from Marmagoa to the Continent for about 10,000 tons, end of March/April 10, with a fair inquiry noted for forward positions. Further tonnage has been taken from Conakry to Poland at the unchanged rate of 25s. f.i.o. and trimmed, basis 14,500 tons for April and 14,000 tons for May/June.

Brazilian ore fixtures include Vitoria/Poland option Hamburg at 49s. and 44s. 6d., respectively, for about 9,800 tons, April 20/30, and about 10,000 tons from Rio to Poland at 49s. for April 1/15. Phosphate is reported fixed from Casablanca to South China at 55s. for 14,000 tons, April 10/May 15, but beyond one or two miscellaneous inquiries to the UK this section of the market is inactive. There are no pyrites fixtures to report from Huelva, either to this side or to the Continent.

Record Output But Lower Profits by Mather & Platt

WHILE the turnover of Mather & Platt, Limited, electrical and hydraulic engineers, etc., of Manchester, reached its highest point ever in 1960, lower profit margins designed to meet increased competition at home and abroad reduced the consolidated trading profit, stated the chairman, Mr. W. L. Mather, at the annual meeting. Fifty per cent. of group sales were in the home market and 50 per cent. in markets abroad.

Mr. Mather said that successful exporting was usually the result of careful planning, often over long periods, so that advanced designs could be offered at competitive prices and with a realistic delivery period. Mr. Mather forecast greater world-wide competition in the traditional Commonwealth markets, in Europe and many other countries anxious to build up their own industries behind tariff walls and other forms of protection. The company, he said, was fortunate in having followed a policy of diversification, and it had undoubtedly stood it in good stead.

Recent Wil's

PIGGOT, W. J., a former director of Laporte Industries, Limited, London, W.1 ... ... £87,042

HOWE, PROF. G. W. O., Emeritus Professor of Electrical Engineering, Glasgow University £35,696

WEIR, SIR CECIL MCALPINE, chairman of International Computers & Tabulators, Limited, London, W.1 £36,687

ARCHDALE, W., a director of James Archdale & Company, Limited, mechanical engineers, of Birmingham £628,988

LONGSTAFF, F., formerly senior partner in Frank Longstaff & Son, Limited, scrap metal merchants, of Hull £3,593

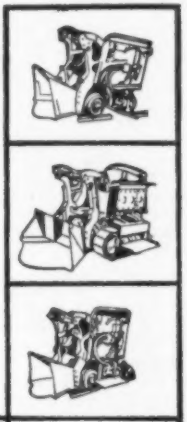
CLIFFORD, W., sales manager, Tinsley Wire Industries, Limited, wire and wire fencing manufacturers, of Sheffield £5,757

ATHEY, MAJ. J. W., chairman of Fordath Engineering Company, Limited, analytical chemists and metallurgists, of West Bromwich (Staffs) £52,051

ADAMS, LORD, FIRST BARON OF ENNERDALE, a member of the Northern Gas Board, and from 1950 to 1954 a part-time director of the Northern (N&C) Divisional Coal Board £22,000

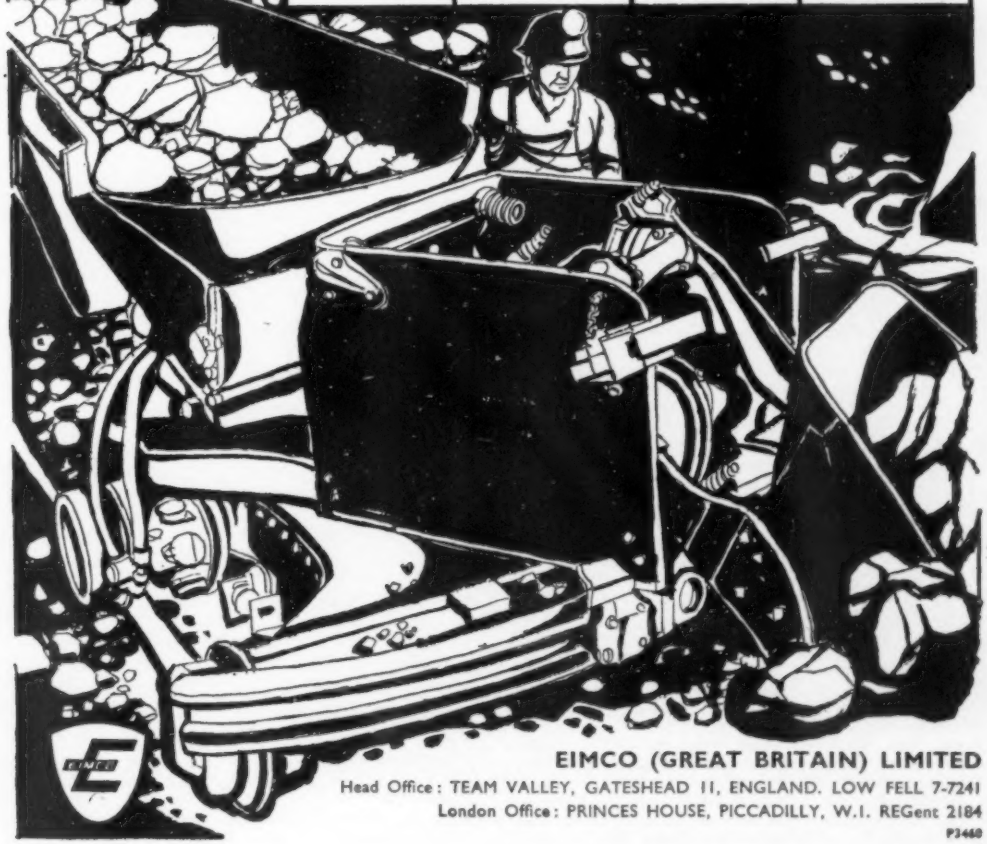
PARKER, WILLIAM ERNEST, a founder director of British Rolling Mills, Limited, Brymill Steelworks, Tipton (Staffs), and a former director of the Audley Engineering Company, Limited, valve manufacturers, of Newport (Shropshire) £50,180

Wherever the going is tough you'll find an EIMCO



However arduous the conditions, you will find that Eimco equipment steps up output, reduces down time, cuts costs and stays on the job longer—much longer.

If YOU have a tough job you can't beat an Eimco



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P3460

CURRENT PRICES OF IRON AND STEEL

(Delivered, unless otherwise stated)
April 6, 1961

PIG-IRON

Foundry and Forge Iron.—No. 3 iron, Class 2, Middlesbrough, £21 17s.; Birmingham, £21 9s. 3d., 10-ton lots or over.

***Low-phosphorus Iron.**—Over 0·10% to 0·40% P, 10-ton lots or over, £23 5s., delivered Birmingham, £23 10s., delivered Grangemouth.

***Basic Pig-iron.**—Delivered in Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics, 10-ton lots or over, £20 3s.

Hematite.—Si less than 2%, S & P 0·03-0·05%, 10-ton lots or over; N.-E. (local iron), £23 19s.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s.; Birmingham, £25 13s.; Wales (Welsh iron), £23 19s.

Refined.—Cylinder and refined irons, South Zone, £25 9s., North Zone, £25 6s. 6d. Refined malleable, max. 0·10% P, South Zone £26 9s., North Zone £26 6s. 6d.

MANUFACTURED IRON

(Bar basis, 2⅝ in. to ¾ in.)

CROWN IRON: England and Wales (Zone 1), £50; Scotland, £49 15s.; Ireland, f.o.q. Belfast, £53; all other Northern Ireland ports, £54, f.o.q. Cable iron, £1 extra.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., 100 tons and over, £31 15s. 6d.; tested, 0·08-0·33% C, 100 tons and over, £32 5s. 6d.; hard (0·41-0·60% C), 50 tons and over, £33 17s.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting steel up to 0·25% C, 50 tons and over, £35 4s. 6d. SIEMENS-MARTIN ACID (50 tons and over): Up to 0·25% C, £40 11s.; silico-manganese, £43 4s.

Billets, Blooms, and Slabs for Forging and Stamping.—Lots of 50 tons and over. Basic, soft, up to 0·33% C, £37; basic, hard, over 0·41 up to 0·60% C, £38 2s. 6d.; acid, up to 0·25% C, £41 14s.; acid silico-manganese, £44 17s.

Alloy Steel (25 tons and over).—BILLETS, 3 in., up to and including 10 in., for re-rolling, 0·6/1% Ni, £46; Ni 2·75/3·75%, Cr 0·5/1·10%, £72 17s.; Ni 2·75/3·75%, Cr 0·5/1·3%, Mo. 0·2/0·65%, £83 7s. BARS: 1 in. dia. and up, nickel, £66 7s.; nickel-chrome, £97 1s.; nickel-chrome-molybdenum, £109 14s.

Other Semi-products, etc.—Forging ingots, up to 0·60% C, £31 12s. 6d. f.o.t.; tube billets, 50 tons and over, £39 10s.; shell steel billets for direct forging, up to and including 0·33% C, 100 tons and over, £37 15s.; tin bars and sheet bars, 50 tons and over, £32 10s. Wire rods, 3g. to 4g. (all areas except Birmingham, Scotland, Southern Joint Area, and Northern Ireland): Soft basic, 50 tons and over £39 17s.; hard basic, 50 tons and over, £43 8s.; free-cutting, up to 0·25% C, 50 tons and over, £45; acid, up to 0·75% C, 50 tons and over, £54 6s. 6d. Stainless steel billets, 3 in. and larger, 10 tons and over, Austenitic, £219 10s.; martensitic, £131 10s.

FINISHED STEEL

Heavy Products (50 tons and over).—Mild-steel plates, ordinary qualities, N.-E. Coast and Northern Joint Areas and Central Scotland, £40 7s.; medium plates, all areas of England and Wales, £43 16s. 6d.; boiler plates, N.-E. Coast and Northern Joint Areas and Central Scotland, £42 17s.; floor plates, N.-E. Coast, £41 16s. Sections (N.-E. Coast, Midland, and Northern Joint Areas, and Central Scotland): Angles, £38 1s. 6d.; bars (rounds and squares), £40 11s. 6d.; flats, £38 6s. 6d.; joists, £37 17s. 6d.

Rolled and Re-rolled Steel Products.—N.-E. Coast, Midland, Northern Joint, and South Wales Areas, and Central Scotland, 50 tons and over: Angles and tees, 4 in. and under, £40 18s. Channels, 3-in. web and under, £40 18s. Flats, 5 in. wide and under, and rounds and squares, under 3 in.: Untested soft basic, £39 1s.; free-cutting, £44 9s. 6d.; hard basic, £41 19s. 6d.; Siemens-Martin acid, £49 12s. 6d.; spring steel, basic, £44 4s. 6d.; spring steel, acid, £53 11s. Glazing tees, £47 0s. 6d. Sash and casement sections, £43 13s. 6d. Gate channels, £50 17s. 6d. Ferro-concrete bars (10 tons to under 500 tons), £39 10s.

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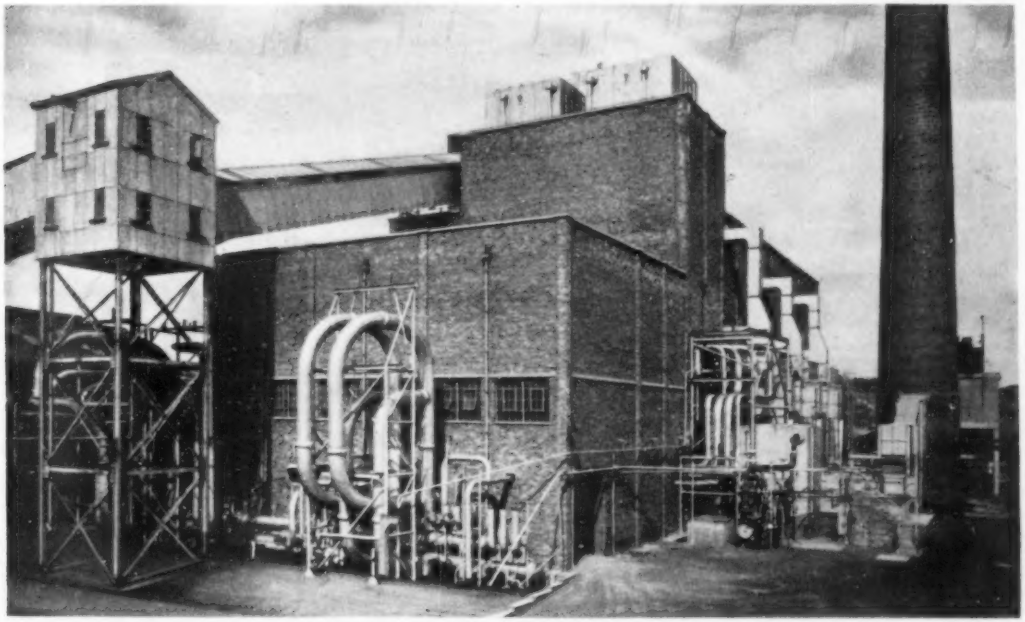

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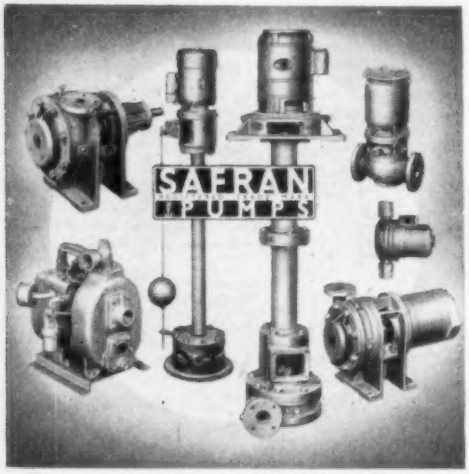

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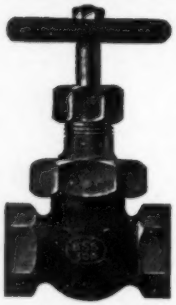

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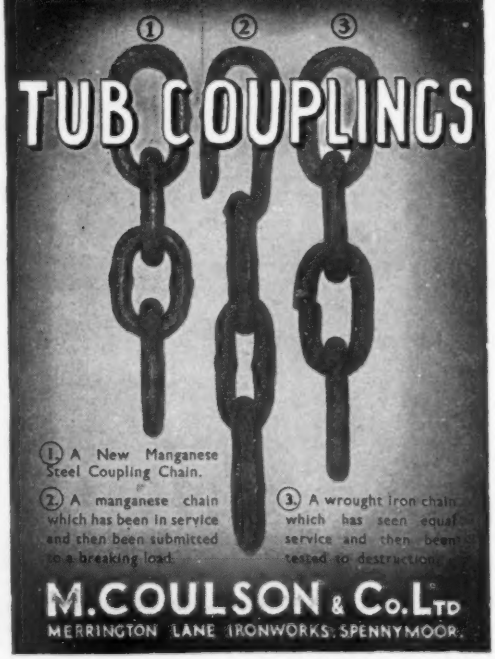

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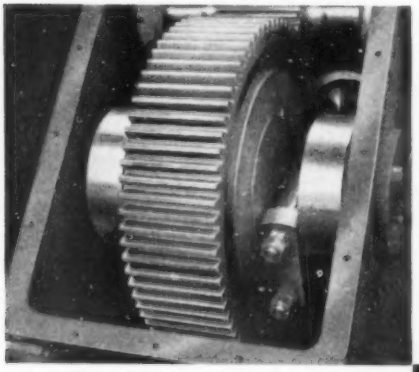

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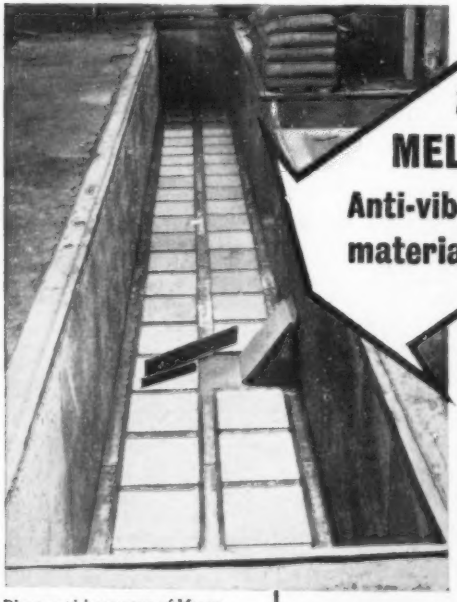

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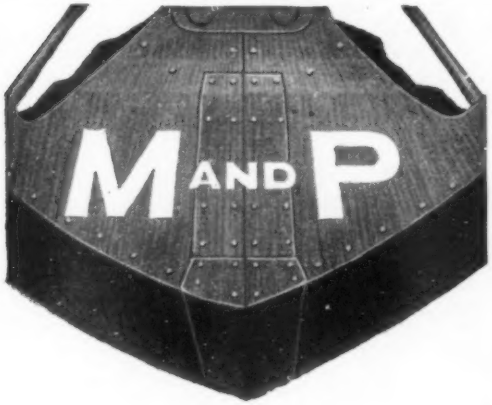

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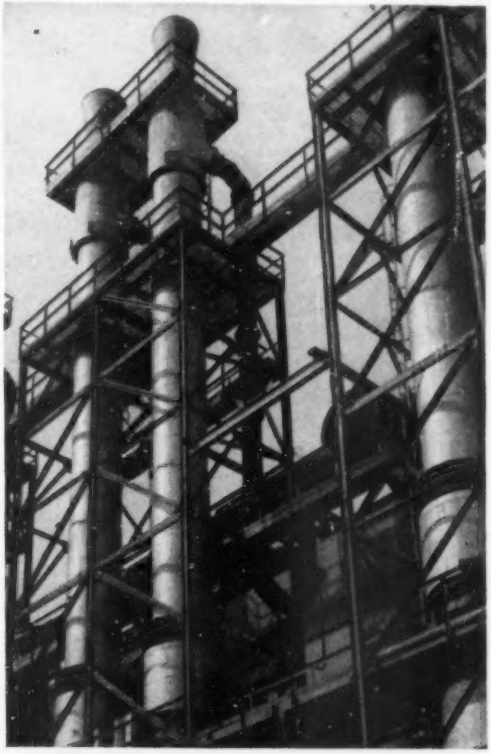

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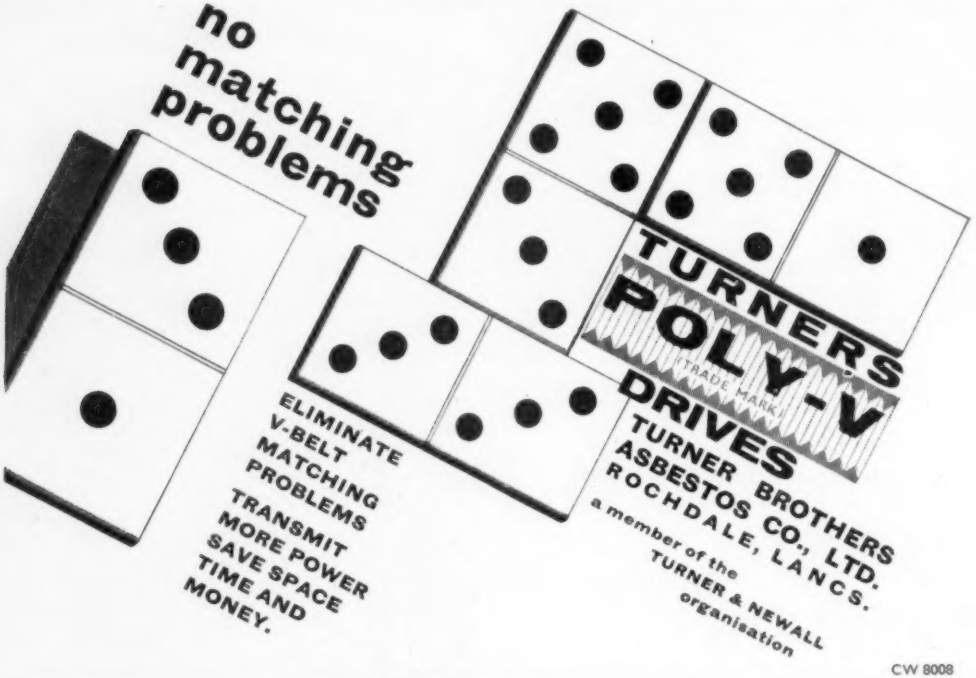

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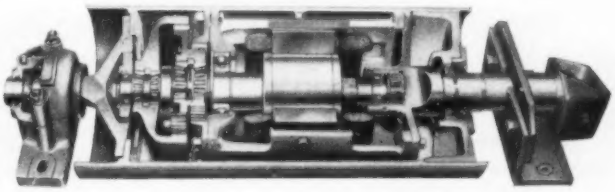

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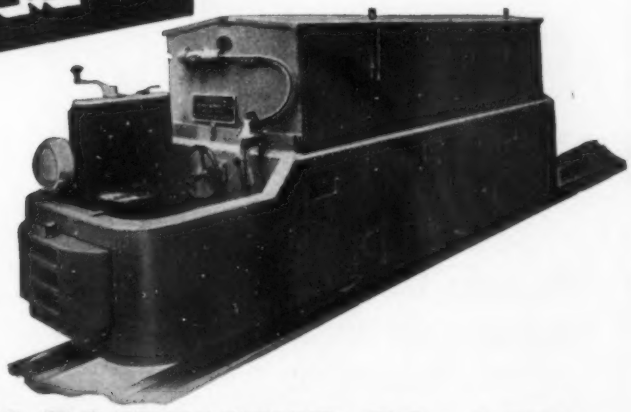

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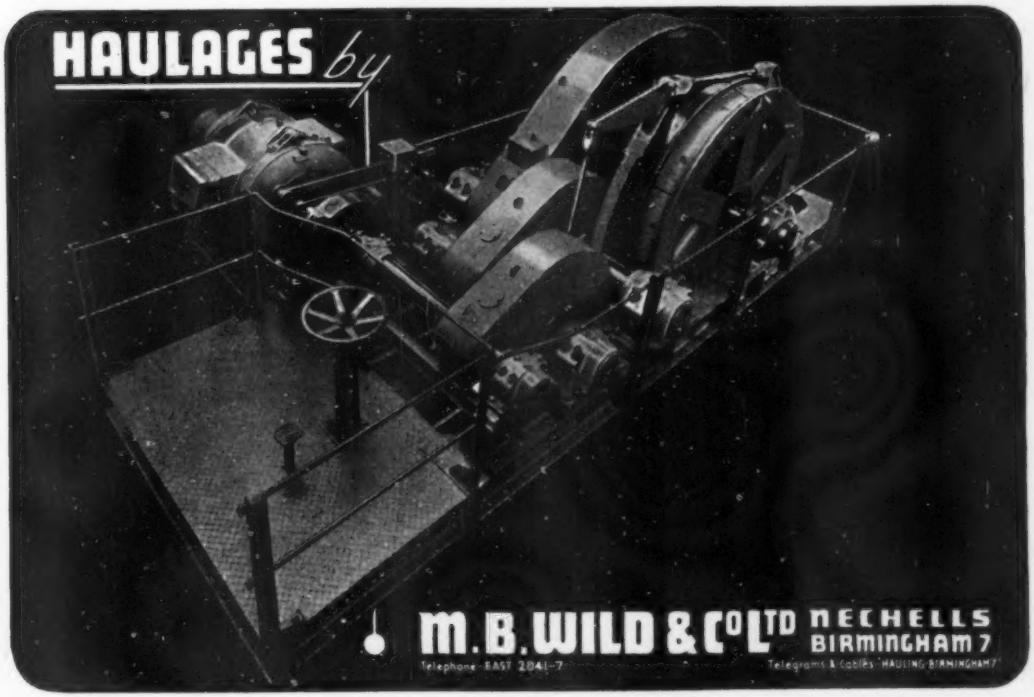

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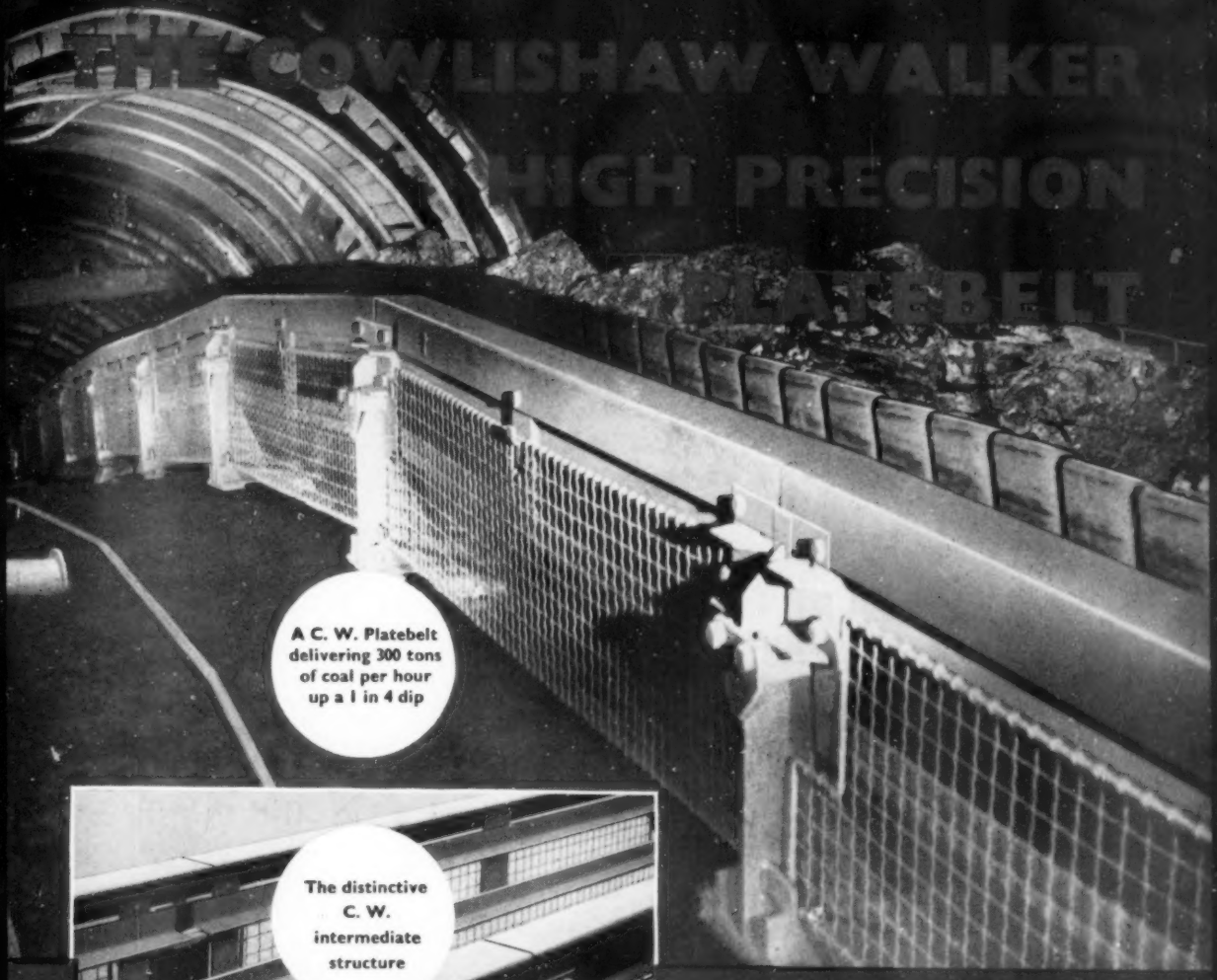

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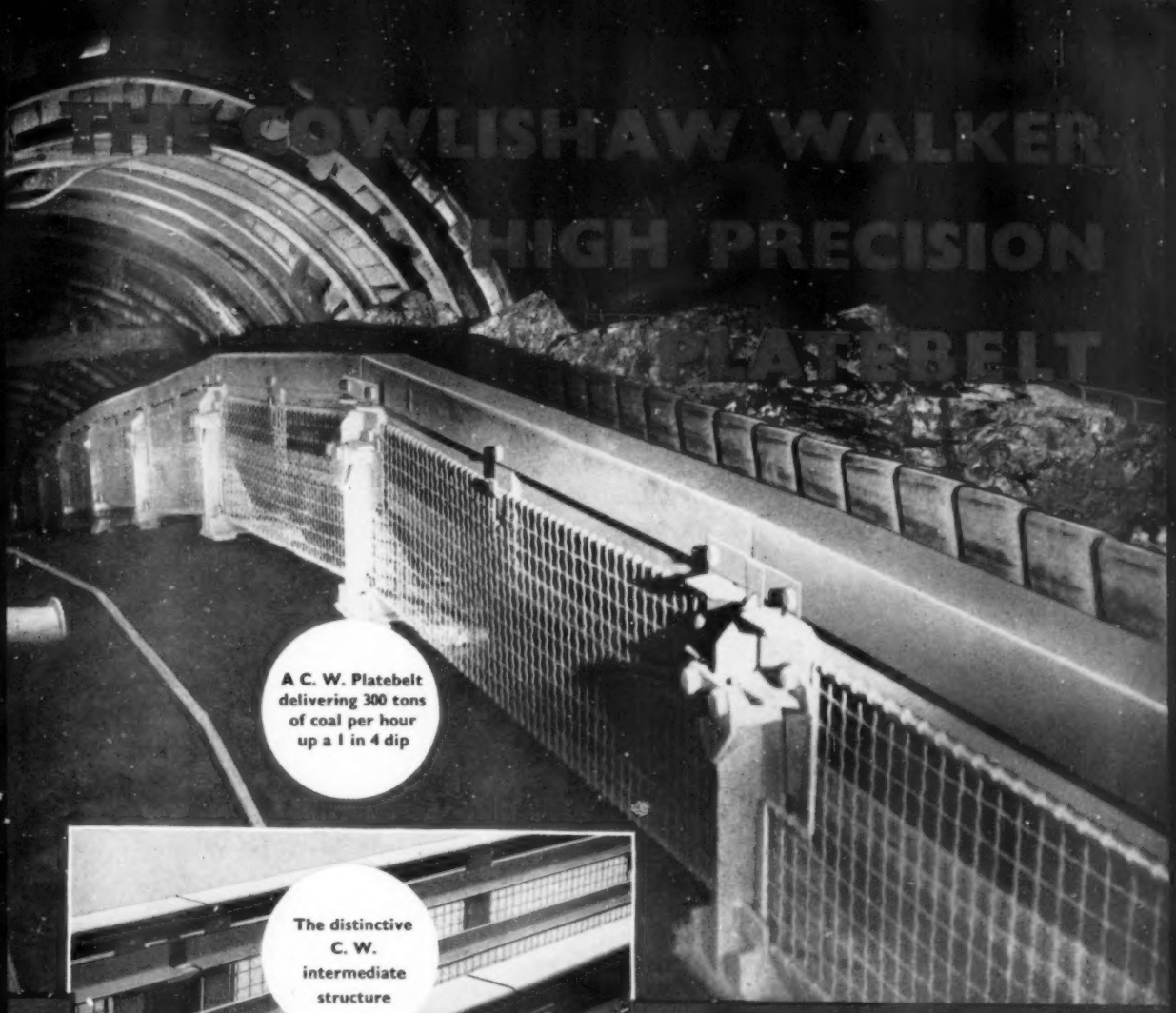

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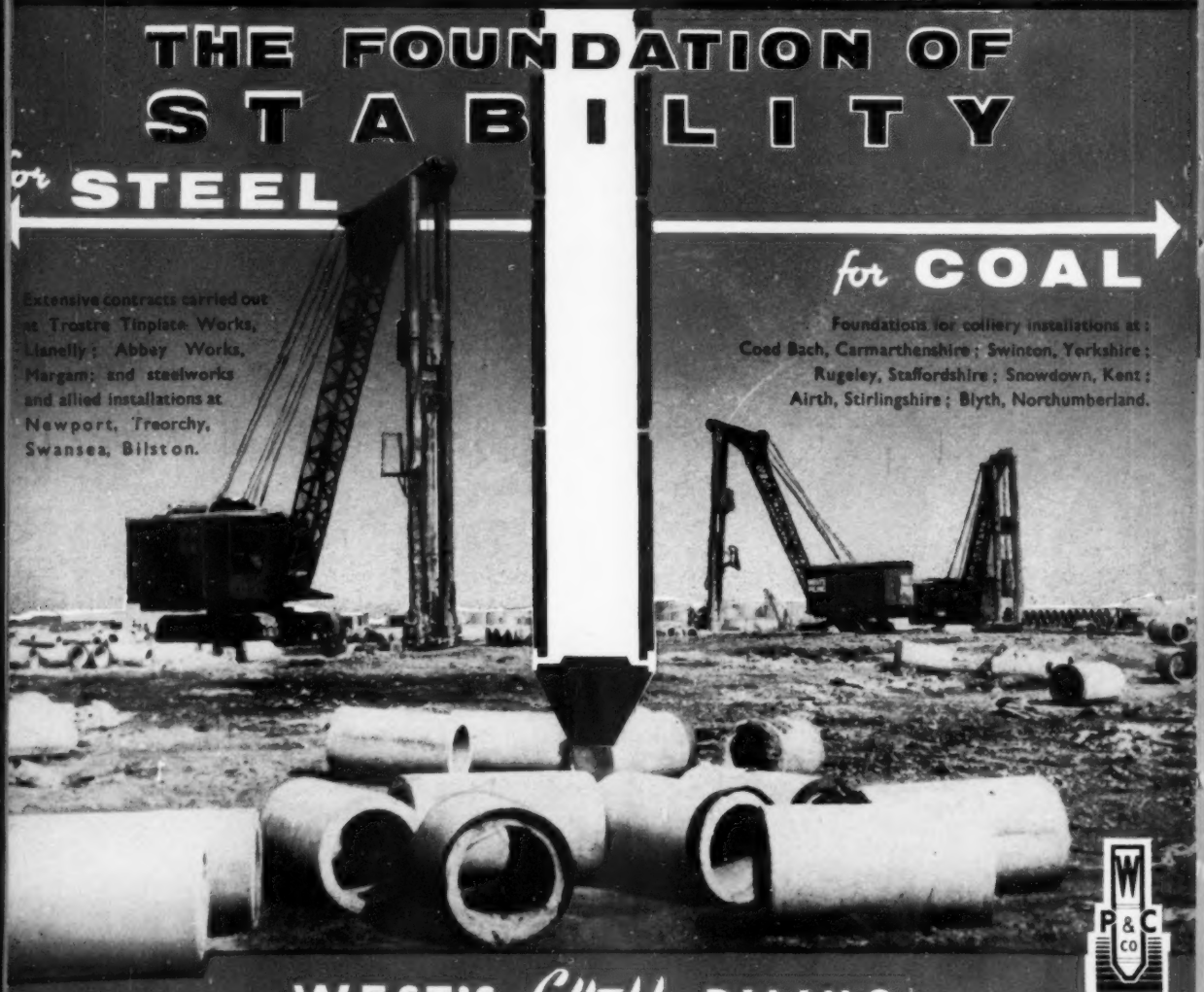

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